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* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XVII, No. 4

Part I. Empire Section

*STATISTICS 519

1357. VAJDA, S. 519.24

Technique of the analysis of variance.

Nature, Lond. 1947 : 160 : p. 27.

It is pointed out, that in extending the technique of analysis of variance to cases involving unequal frequencies in the subclasses and more than one variable, the estimation of effects and interactions obtained from using the method of fitting constants may differ from that derived by using the method of proportionate frequencies. The former method only should be regarded as legitimate.

1358. PENROSE, L. S. 519.24:582

Some notes on discrimination.

Ann. Eugen., Camb. 1947 : 13 : 228-37.

A simplified method of discriminating between two populations is described, in which the number of measured characters is reduced to two compound measurements, "size" and "shape". It is also shown how it is possible to utilize differences in the variances of the two populations in maximizing the degree of discrimination.

1359. FINNEY, D. J. 519.24:631.421

The construction of confounding arrangements.

Emp. J. Exp. Agric. 1947 : 15 : 107-12.

"The systematic formation of the blocks for the confounding of factorial experiments has been described, with special reference to $2n$ and $3n$ designs. The method makes clear the relationships between the several confounded contrasts and the restrictions on their free choice, and, once these contrasts have been selected, enables the constitution of the blocks to be determined by the application of a few simple rules". [Author's summary.]

1360. KEMPTHORNE, O. 519.24:631.421:633.491

Recent developments in the design of field experiments. IV.

Lattice squares with split-plots.

J. Agric. Sci. 1947 : 37 : 156-62.

An experiment on the effect of fertilizers on the yield of potatoes is described, in which three 5×5 lattice squares were used, each whole plot being divided into four. Analyses of variance for the whole plots and the split plots are worked out, together with the estimation of the effects of the various treatments.

1361. CAVALLI, L. L. and 519.24:632.3-1.521.6

MAGNI, C.

519.24:632.8-1.521.6

Methods of analysing the virulence of bacteria and viruses for genetical purposes.

Heredity 1947 : 1 : 127-32.

The authors suggest that the determination of virulence based upon observations on the individual death times of inoculated animals has several statistical advantages over data on survival or death percentages, in investigations on the genetics of host-parasite relationships.

1362. PANSE, V. G. 519.271.3:631.557:633.51

Plot-size in yield surveys.

Nature, Lond. 1947 : 159 : p. 820.

Experiments on the estimation of yield in drill-sown cotton have shown that, while the yield estimated from 1/20 acre plots agreed satisfactorily with the yield from the whole

* General studies, see also individual crops.

field, estimates made from 22 ft² or 218 ft² plots were seriously biased, in the former case up to 42.7% in excess of the true yield.

*BREEDING 575

1363. SCOTT WATSON, J. A. 575:633
Science and the farmer. Lecture to the conference of Scottish agricultural students, Edinburgh, January 31, 1947.
 J. Minist. Agric. 1947: 54: 1-9;

Allusion is made to some of the ways in which plant breeding has contributed to human welfare, special reference being made to work on the potato.

1364. 575:633(41)
Agricultural research in Scotland in 1945. Scottish Plant-Breeding Station.

Trans. Highl. Agric. Soc. Scot. 1946: 58: 123-25.

The following recent investigations are reported (cf. also *Plant Breeding Abstracts*, Vol. XVI, Abst. 9).

Cereals

During the war, experiments on wheat and barley were temporarily discontinued; oat breeding work was, however, continued. New hybrid selections of oats gave promising results in 1945 trials in various districts; two of the most valuable are white-grained short-strawed types, which are early ripening and resistant to lodging. Further progress has been made in breeding oats suitable for general cultivation, and resistant to sprouting during wet weather at harvesting. The production of an improved type tolerant to alkaline soil conditions is also receiving attention; hybrid selections are under test.

A barley line selected from Scots Common and known as Craigs Triumph, is giving good results in the north of Scotland. The grain appears to be a type suitable for distillers. Observation work on two unnamed wheat-rye hybrids from the United States has been carried out. These hybrids are winter hardy under conditions at Corstorphine, but the yield and quality of the grain compare unfavourably with ordinary winter wheat. Introduced wheat-*Agropyron* hybrids are also to be studied.

Phaseolus

The breeding of earlier ripening, higher yielding varieties is in progress. It was found that an appreciable amount of natural crossing occurred. The flowers of experimental stocks are now therefore protected by suitable fabric bags; the enclosed plants set seed moderately well.

Soya Bean

Varietal trials have been carried out. So far no variety has shown promise of being suitable for conditions in Scotland. Varieties of German origin produced the largest plants, but they formed no seeds.

1365. 575:633(42)
Thirty-seventh Annual Report of the John Innes Horticultural Institution. 1946 (1947): Pp. 32.

Genetics and Cytology

The study of the X chromosome in *Drosophila* for polygenic variation affecting the sternopleural chaetae is now complete. Such variation was found to be concentrated at the ends of the chromosome, the left end being responsible for more variation than the right. No polygenic variation appeared to be associated with the middle of the chromosome. The right half or third of the chromosome is heterochromatic, the remainder being mainly euchromatic but also containing small blocks of heterochromatin. It appears, therefore, that both euchromatin and heterochromatin play a part in polygenic variation; the amount of variation shown by any region is not, however, simply proportional to the amounts of euchromatin and heterochromatin present. In the various experiments on selection in *Drosophila melanogaster* conducted during the last eight years, polygenic combinations have

* General studies, see also individual crops.

been found to be balanced within each chromosome. The response to selection depends upon the unbalancing of the combinations by the recombination of genes, following crossing-over. The recombination unbalancing the polygenic combination affecting the character for which selection is being practised also generally unbalances other polygenic combinations, affecting other characters, conditioned by genes in the same chromosome. Such correlated responses in characters for which no artificial selection has been carried out have been observed in selection for chaeta number in *Drosophila*. Fertility, mating choice, frequency of eye abnormalities, and the number of spermathecae in females have all changed concomitantly with selection for chaeta number. Experiments have been begun to determine whether any correlated responses appear in the adult plant upon selection for the character of extra cotyledons in seedlings. Correlated responses have been observed in plants of *Brassica* species grown from pleiocotyledonous seedlings. These include forms with a multiple growing point; a turnip whose seeds all germinated before the opening of the capsule; and a male-sterile rape in which the ovules were often exposed by the imperfect closure of the ovary.

In general, cytological investigations have shown that no chiasma interference acts across the centromere, i.e., from one arm to the other. In a species where chiasma interference is high, however, as in *Culex pipiens*, such interference does in fact occur across the centromere. A related species, *Theobaldia longiareolata*, on the other hand, with weak general interference, shows none across the centromere. The two degrees of interference are therefore probably of the same mechanical type.

Crocus Suterianus ($2n = 6$) has been found to possess heterochromatin. The heterochromatin can be observed in the resting nuclei of the root tip as two chromocentres of equal size attached either singly to two nucleoli, or both attached to a single fused nucleolus. This is the first example to be reported in plants of the organization of the nucleoli in a heterochromatic region, a situation comparable to that seen in polytene nuclei in *Drosophila*. In the early prophase the nucleoli are developed terminally as in *Trillium*.

Previous work has shown that it is possible to detect heterochromatic segments in metaphase chromosomes by cutting off the supply of nucleic acid by cold treatment. The successful application of the method to pollen mother cells of *Rhoeo discolor* is reported. Three other methods of heterochromatin starvation have also been discovered, as follows: (1) the effect of low diet and old age, as shown by a study of chromosomes of the grasshopper *Mecostethus grossus*; (2) starvation of the nucleic acid supply caused by X-ray treatment; and (3) the effect of a 0.2 mol. solution of beryllium nitrate. It appears that probably with these three methods the supply of nucleic acid is in general cut off at the ribose stage, rather than the deoxyribose stage as in the case of cold treatment. By these different methods it is hoped to analyse the synthesis of chromosome materials in the initial stages of mitosis and meiosis.

The method of partition chromatography devised in 1941 by Martin and Synge is being used to compare the free amino-acids present in cells and tissues with different kinds of nucleic activity. Salivary glands of *Drosophila*, root tips of *Trillium*, pollen mother cells and pollen grains of *Fritillaria* and *Tradescantia*, and the yolk and white of a hen's egg have been examined.

It has been found that X-ray treatment and treatment with mustard gas can be so regulated that their effects upon chromosome behaviour are indistinguishable.

Multinucleate yeast cells produced by chemical treatment are unstable, giving rise to uninucleate cells during budding. These daughter cells, however, retain the character of increased size shown by the multinucleate cells; thus the mutant cells possess a new and stable relationship between nucleus and cytoplasm, in which there is a higher proportion of self-perpetuating plasmagenes.

From a general study of the action of chemicals on cells, it has also been found that some of them can arrest nuclear development while allowing cytoplasmic synthesis to continue more or less normally; these "mitostatic" agents are thus able to bring about a new relationship between nucleus and cytoplasm. In the lower organisms, such as yeast, the changed relationship may be stable, but in the higher organisms it takes the form of dauermodifications of limited or unlimited extent.

Certain inbred lines of *Primula sinensis* with flowers of the pin-eyed type have been

observed in which the anthers are in their usual position half-way down the corolla tube, but the style is shortened to a variable extent, so that the flowers of one or more plants may show the full range of stigmata in the normal position to stigmata on the same level as the anthers. Interbreeding these abnormal inbreds completely restores the regular pin form of the flowers in the F_1 . The genetics of the abnormal conditions are to be further investigated. The genes for Primrose Queen eye (a) in *P. sinensis* and for fertile double flowers (m) turn pin-eyed flowers (ss) into homostylous flowers, the former by shortening the style to give a short homostyle, the latter by lifting the stamens to give a long homostyle. It has now been found that these effects are additive so that with the two genes together a pin-eyed flower ($aa\ mm\ ss$) with short style and long stamens is produced; such a flower is therefore a pseudo-thrum. Correspondingly, a flower with the genetic constitution $aa\ mm\ Ss$ has a lower stigma and higher stamens than normally, and is thus a super-thrum. The incompatibility relationship of these forms is to be investigated. In pin-eyed flowers of tetraploid *P. sinensis* the gene a when nulliplex (a_4) gives not only the characteristic eye and short homostyle, as in diploids, but also makes the plants female sterile. The simplex condition of the gene ($A\ a_3$) has in the past also resulted in a short homostyle, although the plants are female fertile and without the pin-eyed effect. Natural selection appears, therefore, to have been modifying the expression of this gene in the tetraploid condition. Recently no true homostyles have appeared among simplex plants; and a family of nulliplex plants has been raised by natural pollination which was undoubtedly self-pollination. Lines have been isolated from the cross *Antirrhinum majus* $\times$ *A. glutinosum* in which the corollas seldom open sufficiently for insects to penetrate the flowers; seed set by these cleistogamous flowers must therefore be the result of self-pollination. Thus two species, one of which is regularly cross-pollinating and the other of which frequently cross-pollinates, carry between them the genes necessary for an obligatory inbreeding mechanism.

A single mutation induced at the S locus in *Oenothera organensis* by X-ray treatment of an anther cell at a stage of five mitotic divisions before meiosis was investigated. The family of 34 plants arising from this mutation were all found to be self-compatible, in contrast to the usual self-incompatibility. An analysis of test crosses revealed that mutation had occurred in the allele S_6 . The mutant allele, designated S_6' was inactive in the haploid pollen grain, so that pollen carrying it was compatible on styles carrying either the original allele S_6 or the mutant allele S_6' . In the haploid tissue of the style, however, allele S_6' , in the presence of a normal allele, S_3 , was fully active and repelled pollen bearing allele S_6 . It is therefore suggested that the structure of the S gene is double, consisting of (1) a highly specific part which determines the characteristic incompatibility reaction of a particular S allele, and (2) a less specific part which functions as an activator; the specific part would differ for each allele, but the same activator would be common to several alleles. Thus the mutant gene S_6' gives the normal reaction of S_6 in the style when in the presence of the common activator from S_3 , since it has retained its specific part unchanged. The less specific activating part of the mutant gene, however, has been rendered ineffective, and this part is inhibited in the haploid pollen grain. Experiments are being carried out to determine the action of S_6' when present with a normal allele in a diploid pollen grain derived from a tetraploid.

Experiments on the stimulation of fruit formation in *Oenothera organensis* by growth substances were undertaken as part of the investigations on mutation of the S locus; since spontaneous mutation of the S gene usually results in only a single pollen tube in a style, it is important to be able to recover the seed fertilized by it. It was found that a 0.02% solution of β -naphthoxyacetic acid, applied to flowers 24 hours after they had received pollen grains, stimulated fruit formation, and thus allowed the low number of fertilized seeds to develop, clearly providing a method of recovering mutations of the S gene.

Rye

The effects of population size upon variation were studied.

A seedling of Carter's Giant rye, with two small supernumerary or B chromosomes of the type already described by workers in Sweden and other countries, was crossed reciprocally with the ordinary type ($2n = 14$). From the cross designated 16×14 , 40 plants with $2n = 14$ and nine plants with $2n = 16$ were obtained; the reciprocal cross produced 28

plants with $2n = 14$ and 21 plants with $2n = 21$. The absence of progeny with 15 chromosomes confirms the observation that in mitosis at male and female sporogenesis, *B* chromosomes pass as double chromosomes to one pole whenever they are not lost. Evidently *B* chromosomes have centromeres of subnormal strength. This view is supported by the similar behaviour observed in root tips kept for 13 days at 0°C . This hypothesis also explains the loss of supernumerary chromosomes in somatic cells of other graminaceous species such as *Sorghum* and *Poa*. Five out of the seven ordinary chromosomes of rye, possess segments of heterochromatin placed terminally like those of *Trillium*, and showing nucleic acid starvation as a result of cold treatment (cf. above). The *B* chromosomes in one plant were heterozygous, only one showing a small heterochromatic segment; this segment was intercalary. In view of the passage of double *B* chromosomes to one pole, this heterozygosity must have arisen by the change of one chromosome during the development of the plant. Such instability of the heterochromatin has also been inferred in the case of *Trillium*.

Euchlaena

In 1941, a tetraploid seedling ($4n = 40$) was raised from the cross of the tetraploid *Euchlaena perennis* with diploid maize, the seedling originating from an unreduced maize pollen grain. The seedling failed to set seed, probably because of self-incompatibility. The remainder of the seedlings were sterile triploids, as expected, and resembled the *Euchlaena perennis* parent. A selected triploid propagated at Kew has been distributed to research stations under the name of *Euchlaeza mertonensis* or Merton Grass. This is now being tested as a fodder plant in Trinidad.

Brassica

The amount of cross-pollination occurring within a group of *Brassica* species with the same chromosome number and between groups with different chromosome numbers was analysed with regard to the problems of seed production.

Potato

Investigations of bolters show that they arise vegetatively with a high frequency and regularity in commercial clones, and that the percentages of bolters occurring in the sexual progeny of selfed bolters and crosses between bolters and normal plants show little difference.

Nicotiana rustica

Investigations on the inheritance of plant height and date of first flowering are in progress. Experiments on the effects of removing the inflorescences and side shoots and of nitrogenous fertilizers are reported.

Fruit trees

Five cherry seedlings have been named, viz., Merton Bigarreau (No. 193), Merton Favourite (No. 185), Merton Heart (No. 404), Merton Premier (No. 318) and Merton Bounty (No. 490). The first two varieties have been derived from the cross Knight's Early Black x Bigarreau Napoleon. Merton Heart was developed from Bigarreau de Schrecken x Elton, and Merton Bounty from the reciprocal cross. Merton Premier was produced from the cross Emperor Francis x Bedford Prolific. A limited amount of propagating material of these seedlings will be available in the autumn of 1947.

Pear seedlings showing promise in habit, vigour of growth and fruit quality have been selected and propagated on quince "C" rootstocks.

It is pointed out that the production of triploid apples by the use of unreduced pollen resulting from heat shock treatment, together with the action of incompatibility, involves some suppression of segregation. The advantage of this suppression of segregation in breeding heterozygous fruit material has been demonstrated by tests for immunity to woolly aphid. Triploid seedlings obtained from Northern Spy are all immune like Northern Spy. Since crosses between immune diploid apples give only 20% of immune progeny, it is evident that the genes controlling immunity did not segregate in the formation of the unreduced pollen.

Cytological investigations have shown that in the cherry and apple, failure of chromosome pairing in meiosis induced by high temperature ($44.5 \pm 0.5^{\circ}\text{C}$.) is limited to the period corresponding with zygotene pairing. Chiasmata must therefore be formed during the

process of pairing, probably when the chromosomes reproduce. In plants with localized pairing, it is suggested, the number of chiasmata should be approximately proportional to the length of chromosomes which can pair before they reproduce. The length of chromosomes paired will depend both on the rate of pairing and on the speed of the synthetic processes of chromosome reproduction. According to this hypothesis, failure of chiasma formation results from a slowing down of chromosome reproduction. A comparison of viscosity values at different temperatures has led to the conclusion that a slowing down of the rate of pairing may be important owing to an increase in the viscosity of the nuclear sap, in contrast to the general interpretation that a relative advance in the time of chromosome reproduction causes the failure of chiasma formation.

Work on incompatibility continues. In the year under review it was found that the Maiden's Blush cherry is incompatible in Group II, and the varieties Caroon and Noble form a new group, Group XII. Pollination data have been obtained indicating that the pear varieties Louise Bonne, Laxton's Superb and William's Bon Chrétien (the American Bartlett pear) fall within the same incompatibility group.

Mutations of the S locus have been produced in the sweet cherry, apple and pear, by X-radiation (45–600r.) of pollen mother cells, and detected by incompatibility tests. In order to obtain spontaneous mutations, a large sweet cherry tree producing approximately 50,000 flowers was enclosed in a pollen-proof cage and pollinated by a hive of bees. The 30 seeds formed gave 19 plants, and represent natural mutations of the S locus out of approximately 60 million pollen grains. A comparison between natural and X-ray induced mutations will be possible when the seedlings flower.

It has been noted that the black mulberry (*Morus nigra*) produces a proportion of light seeds, which lack endosperm and germinate precociously; these seeds probably arise by diploid parthenogenesis.

Radish

In a comparative trial of diploid and colchicine induced tetraploid forms of Scarlet Globe, the tetraploid flowered much later than the diploid. The tetraploids are ready for pulling and marketing as early as the diploids, and since they do not run to flower so quickly they can be pulled for use over a longer period.

Vegetable marrow

Tetraploid plants produced by colchicine treatment possessed broad fruits; when self-pollinated they gave light seeds. These seeds all lacked endosperm, and their embryos were all small. The embryos were extracted and grown on Knop agar. Two plants were secured which proved to be diploid and fertile, and they also bore broad fruits, smaller than those of the ordinary diploids. The seeds produced by the tetraploid plants were evidently the result of haploid parthenogenesis.

Tomato

Varietal trials carried out during the period 1940–6 to study yield and other characters under conditions out-of-doors are reported. The production of F_1 hybrids is under investigation. Breeding and selection for high yield and early maturity was continued, including work on dwarf and bush forms. A new type combining the desirable characters of dwarf and bush types has been secured; its inflorescences are close together as in the bush form, but the fruits are borne on a strong stem about 15 in. above the level of the ground. It has been noted that at late diakinesis two large masses of heterochromatin are completely starved of nucleic acid under normal temperature conditions; two or three minute but deeply staining bodies can, however, be observed inside the heterochromatin at this stage. The latter are similar in size to the bodies extruded from the radish and *Brassica* spp.

Phaseolus

Selection of haricot for early maturity, high yield and compactness of growth was continued. An analysis of cross-pollination in the runner bean has shown that 64% of the seed results from selfing, 7% from pollination with other flowers on the same plant, and 29% from crossing with other plants. In the dwarf bean, a type of male sterility develops under certain conditions, due to the germination of the pollen within the anther before shedding; this may be the cause of the sporadic out-crossing observed in the dwarf bean.

Sweet Corn

Selection for the capacity to germinate in cold ground was continued. Three lines gave over 50% germination and survival to maturity when sown mid-February. When sown in mid-March these lines showed a virtually complete survival.

1366.

575:633(54.3)

**Annual Administration Report of the Agriculture Department
United Provinces for the year ending 30 June, 1945 (1947) : Pp. 86.**

Wheat

I.P.125 has shown a superiority of yield over C.13. Selections 38/15 and 41/9 have given a promising performance in comparison with C.13 and I.P. 25.

Maize

Various types were tested.

Barley

The huskless selection C.N. 292 gave a very high yield at the Cawnpore Farm, and matured ten days earlier than the standard husked types C.251 and I.P. 21; the crop received only one irrigation, indicating the hardy nature of the naked form.

Millets

Selections and strains of *Sorghum vulgare*, *Pennisetum typhoideum*, *Panicum frumentaceum*, *Eleusine coracana*, *Setaria italica* and *Paspalum scrobiculatum* were studied.

Rice

Improved types for different districts are under trial.

Promising hybrid selections with a very early maturity have been developed by crossing Chinese varieties and some of the improved strains under distribution.

Potato

Flowering was not found to have an adverse effect upon yield; this result is in complete variance with that obtained at the Minnesota Agricultural Experiment Station, where both flowering and fruiting caused significant reductions in yield; the experiment is to be continued.

Cotton

The production of desi cottons with superior quality is in progress. Hybridization of A.D. 34/4, 35/1, 35/3, 35/6 and 36/5b with finer quality cottons, such as Verum and Jarilla, is being carried out with this purpose. Varietal trials of desi and American cottons are reported. Breeding and re-selection of American cotton is receiving attention.

Sunn hemp

The breeding of white-seeded sunn hemp continues, also the selection of type C-12.

Sugar cane

Varietal trials are reported. Seedlings and imported varieties are under observation. In tests of resistance to red rot CoS 302, CoS 222, CoS 163 and Co 393 showed the least infection.

Oil seeds

Linseed strain 1193/2 isolated from T.1193, is recommended for distribution in Bundelkhand to replace the local varieties, and types 1193 and 1150. This strain is high yielding, early in maturity, and rust resistant.

The selection of larger-seeded hybrids suitable for the north-eastern districts of the province is being continued.

Preliminary trials have confirmed the superiority in yield of type 477. The following mustards are receiving attention: rai (*Brassica juncea*), sarson (*B. campestris*) and lahi or tori (*B. Napus*). A search for rai types suitable for mixed cropping with wheat is being made; the seed of Et3/2 is to be multiplied for further tests. A sarson type AGH-A has been selected for the central and western districts; a promising selection of type II is to receive further trial. Varieties of *Sesamum orientale* are under observation. The early selection C10, recommended for alluvial tracts, was multiplied; it has white seed and is moderately branched.

Castor oil

Varietal trials are reported.

Groundnut

Varieties were analysed for nut size, shelling percentage and other characters. Type C25 was further multiplied. Type C9 is considered as suitable for distribution.

Pulses

Work is reported in the following crops: *Cajanus Cajan*, *Phaseolous Mungo*, *Ph. aureus*, *Ph. aconitifolius*, gram, pea, *Ervum Lens*, *Dolichos Lablab*, *D. biflorus*, *Vigna sinensis* and soya bean.

1367.

575:633(54.7)

Fifth Annual Report of the Institute of Agriculture, Anand, for the period ended 31 March, 1945 : Bull. No. 5 : Pp. 45.

Sorghum

Individual plant selections of sundhia jowar exhibited significant differences in yield of grain and fodder. Out of 518 selections, 384 were retained for further investigation. New material is also to be collected from various localities for the purposes of selection.

Fennel and cumin

Selection for yield and earliness is in progress.

1368.

575:633(6)

Report of the East African Agricultural Research Institute, Amani, for the years 1942-1945 (1946) : Pp. 43.

Agave

Plants of the F_1 hybrid *A. angustifolia* x *A. amaniensis* have been self-pollinated, and also pollinated with pollen from both parental species.

Reciprocal crosses were also made between *A. amaniensis* and *A. horrida*, *A. Zapupe* and *A. Brandegeei*. The F_1 generations of these crosses are being raised at Amani. *A. Brandegeei* and *A. Zapupe* failed to set seed on selfing.

The cross *A. amaniensis* x *A. horrida* and the reciprocal have produced some promising plants with non-spiny leaf margins.

Cassava

A report is given of the breeding programme begun in 1937 to develop virus resistant types (cf. also Abst. 996).

Several clones with various degrees of resistance to mosaic and brown streak have now been obtained by intervarietal hybridization.

In the work of interspecific hybridization, the F_3 back-cross generation has now been reached in the following three hybrids: cassava x "tree" cassava; cassava x ceara; and cassava x *Manihot dichotoma*. Most of this material awaits field trial, but the clones from all three hybrids so far tested show a high degree of resistance to one or both viruses. The root systems of these clones are variable; some continue to be woody like the F_2 generation, while others show a pronounced tendency to be tuberous.

During 1945, over 2700 seeds were harvested from controlled crosses. About 1000 of these seeds were from intervarietal crosses between the more resistant varieties of true cassava. The seed has been distributed for propagation and extensive trial. The remainder of the seed consisted mainly of back-crosses to cassava of F_2 selections from hybrids between cassava and *M. dichotoma*, *M. Glaziovii* and "tree" cassava. Seedlings have been raised and the material is to be multiplied for field trials.

The flour analysis of F_3 hybrid tubers has compared very favourably with that obtained from true cassava.

Future breeding work will be mainly concentrated on further back-crossing of inter-specific hybrids. Clones showing resistance to natural virus infection in the field will be subjected to immunity tests by the grafting technique.

Coffee

Yield recording was continued. A hybrid between *Coffea eugenoides* and *C. excelsa* flowered for the first time in 1944, and produced a fair crop and viable seeds.

Tung

The recording of individual tree yields was continued.

Cinchona

Selection of *C. Ledgeriana* and *C. Ledgeriana* x *C. succirubra* is reported, based upon alkaloid content and vigour. Selected trees are being propagated vegetatively and from seed.

Propagation by cuttings taken from young seedlings is also in progress; the tops of young seedlings root easily, and it is possible to get several rooted cuttings from each seedling if the tops are taken out of the succession of shoots.

In experiments on the vegetative propagation of cinchona, considerable variation in rooting capacity has been noted among *Cinchona* species and varieties; *C. succirubra* showed a high rooting capacity in all treatments; *C. Josephiana* proved to be the most difficult to root. The species and varieties represented in the *Cinchona* nurseries recently established as a result of a grant by the Government of Tanganyika in 1943 include various strains of *C. Ledgeriana*, *C. Josephiana*, *C. hybrida* and *C. succirubra*.

1369.

575:633(66.4)

Annual report of the Department of Agriculture, Colony of Sierra Leone for the year 1945 (1947) : Pp. 24.

Rice

At Njala 40 varieties of upland rice were grown; the most promising were selected for further trial. Varieties are also under trial at Makeni and Rokupr.

Observations on varietal resistance to *Piricularia* are included in the experimental work in progress at Rokupr. It has been noted that varieties free of *Piricularia* in wet seed nurseries were attacked by the disease when grown in dry beds. The isolation of pure lines of D.C. 39, Ngasein, Toma, Indo-China, India Pa-lil and Kavunginpoothala is also reported at this station.

Sweet potato

The Mississippi variety gives a very good performance as a dry season type for swamp cultivation in the Makeni area.

Yam

The Jaffna King and Chinese varieties exhibited the best quality in observation plots at Njala; Jaffna King was also the highest yielding variety.

Coffee

The recording of individual tree yields was continued at the Njala Station.

Blue Mountain has given fairly good results at Makeni; it may prove to be suitable for cultivation in the higher altitudes.

Oil palm

Work on the recording of individual tree yields was continued at Njala. The Angola palms are the most promising; a pure line multiplication plot of the best tree is now coming into bearing.

Onion

The possibility of onion production in Sierra Leone is under investigation.

1370.

575:633(68)

Annual Report of the Department of Agriculture for the year ended 31 August, 1946.

Fmg S. Afr. 1947 : 22 : 77-360.

Wheat

The production of root-rot resistant varieties is receiving attention at the Stellenbosch-Elsenburg College. The fungus *Ophiobolus graminis* appears to be the main cause, but *Fusarium* sp., *Helminthosporium sativum* and *Wojnowicia graminis* also contribute to the disease.

Triticum-Agropyron

Triticum-Agropyron hybrids show more promising disease resistance than the widest interspecific *Triticum* crosses in investigations at the Potchefstroom College. Annual forms of value to the wheat breeding programme have been secured from wheat-*Agropyron* hybrids; but for the production of large-seeded perennial forms, the investigations have not yet been carried out for a sufficient length of time.

Maize

Hybrids of Potchefstroom Pearl and the yellow Hotnot variety were back-crossed to the former variety for several generations; a type showing similarity to Potchefstroom Pearl but with yellow seed has been secured. Crosses of Potchefstroom Pearl with Sahara, Robyn and other varieties were also obtained.

In the work of the Division of Botany and Plant Pathology, South African and American commercial varieties have proved susceptible to the maize streak virus. A variety of *Euchlaena mexicana* and a variety of *E. perennis* have exhibited immunity; this suggested that these may be useful in breeding resistant maize.

It is mentioned that at Nelspruit breeding lines with promising virus streak resistance are under investigation.

Sorghum

Broom sorghum is being selected with the object of producing coarse, medium and fine types of fibre.

The witchweed resistant variety of grain sorghum, 37R9, is to be used in breeding.

Leguminous forage plants

Lucerne breeding is being carried out at Grootfontein College of Agriculture as part of the breeding programme to develop improved hay, pasture and dryland types, and also increased frost resistance.

Clover and lupin breeding is reported from the Stellenbosch-Elensburg College. Lupin varieties have been produced showing practically no seed lignification.

Tobacco

The breeding of snuff tobacco with high quality and mosaic resistance is being carried out at the Nelspruit Station.

At Rustenburg nicotine tobacco varieties of *Nicotiana Tabacum* and *N. rustica* are being studied.

Tung

Rootstock trials with *Aleurites montana* and *A. Fordii* are reported.

Fruits

The Nelspruit Research Station has a wide range of introduced species and varieties of citrus trees under investigation; breeding and selection are in progress.

Varieties of avocados, mangos, litchis, pecan and other subtropical fruits are also under observation at Nelspruit.

The new Hortus Gold variety of papaw is now in commercial cultivation.

Selections of the Kakamas variety of canning peach show considerable differences in time of ripening.

Introduced pineapple varieties are being tested at the Bathurst Experiment Station. The Australian Cayenne varieties Cayenne Zuill and Cayenne Q.A.S. are bearing fruit with a single crown; this character is a distinct improvement over the South African Smooth Cayenne which bears about half of its fruit with double or multiple crowns.

Hybrids between the Queen and Smooth Cayenne pineapples are being studied.

Peach, pear, plum and grape varieties, and several subtropical fruits are under observation at the Western Province Fruit Research Station, Stellenbosch. About 5000 hybrid guava trees were studied. New peach hybrids were planted out. Selection of the Cape gooseberry has been begun. Strawberry hybridization is also in progress.

In addition, guava hybrids and selections have been analysed for vitamin C content. Varieties of plum were studied for their suitability for jam manufacture and canning. The suitability of prune varieties for preservation in various forms was investigated. Tests

were also carried out on the value of strawberry and fig varieties for different processes of preservation.

Groundnut

Breeding work at the Potchefstroom College of Agriculture aims at combining the desirable characters of varieties from South America, Java and the United States, with early maturity.

Vegetables

Onion selection and breeding were begun in 1943. Selection of a local variety grown in the Uniondale district has been carried out.

A programme of inbreeding and the recombination of inbred lines is in progress with carrot, beetroot and spinach beet.

Pumpkin and squash breeding is reported.

The Argentine native marrow has proved a valuable parent in breeding for higher yield in the Hubbard squash; segregants have been isolated which bear fruit both on the main stem and on runners, usually at each node. Normally, the Hubbard squash bears no fruit on the stem, and the first fruit is produced on about the eleventh node of the runner.

New tomato strains have been produced showing immunity to bacterial wilt; breeding is in progress to combine this immunity with satisfactory commercial qualities.

Varieties of carrots and other vegetables were tested for their suitability for various processes of preservation.

Cowpea

The new type, No. 3706, is being utilized in breeding drought resistant cowpeas with the erect habit. Wild forms of cowpea are to be crossed with cultivated varieties.

Soya bean

Breeding at the Potchefstroom College of Agriculture is reported.

Pea

Hybridization has been effected with a view to developing early maturing peas suitable for the semi-tropical conditions of the eastern Transvaal low veld.

1371.

575:633(68.3)

**Annual report of the Livestock and Agricultural Department,
Swaziland. 1946 : Pp. 45. (Mimeographed.)**

Maize

At Aird Farm, American White Flint, streak resistant hybrid maize and local strains of Hickory King were crossed with two highly inbred strains obtained from the Southern Rhodesia Department of Agriculture, in an attempt to obtain higher yielding strains.

The streak resistant hybrid between Peruvian and Hickory King was back-crossed to Hickory King to secure improvements in the strength of stem and root.

Further selection work was carried out on strains of Hickory King, American White Flint and local native maize.

Kaffir corn

An attempt is being made to improve the grain quality of the local dwarf, aphid-resistant kaffir corn by crossing it with other strains.

The Makanye strain from the Bechuanaland Protectorate is under observation.

Sudan grass

Seed of Rhodesian Sudan grass (*Sorghum arundinaceum*) is being multiplied for use in witchweed control.

Cotton

In a varietal trial at Croydon sub-station of strains obtained from the Empire Cotton Growing Corporation, Barberton, a new strain yielded 900 lbs per acre of seed cotton as compared with the yield of 600 lbs from the old bulk 5143 now in general use.

1372.

575:633(68.6)

Annual report of the Department of Agriculture, Basutoland, for the year ended 30 September, 1946. Pp. 28.

Wheat

Breeding continues.

A varietal trial of Ceres, Talberg, Hope, Marquis and Thatcher, conducted at Makhaleng is reported.

Kaffir corn

Local varieties and varieties from Swaziland were tested at Maseru.

Forage crops

Various species have been investigated for their suitability for the lowland regions. *Eragrostis chloromelas* and *E. curvula* are considered to be the most promising grasses.

Potato

Four unimproved varieties were collected and tested. Butha Buthe 1 gave the highest yield of 28,120 lbs per acre.

1373

575:633(72.9)

Administration report of the Director of Agriculture, Trinidad and Tobago, for the year 1945 (1946) : Pp. 20.

Rice

Hill paddy selection is in progress.

A trial of 22 salt-tolerant varieties was carried out at Bejucal. Each variety was grown in brackish and fresh water; uneconomic yields were produced in the brackish water, and only low average yields in the fresh water. Variety No. 7 gave the best yield under both conditions of cultivation. Each variety was subjected to single selection.

Sugar cane

A trial of 23 varieties is reported. The soils on which B.34104, B.3337, B.37172 and B.37161 are likely to give the best results are indicated.

Cacao

At the River Estate, observation work is being carried out on the witches' broom resistance of 32 clones introduced from the Amazon Valley.

Witches' broom resistant trees of local and South American origin which have exhibited no infection during the past nine years at Marper were propagated. Hybridization between I.C.S. (Imperial College Selection) and W.B.R. (Witchbroom Resistant) trees is to be effected.

Rubber

Propagation of oriental clones and leaf blight resistant clones is reported.

Avocado

Late maturing West Indian-Guatemalan hybrids are now in commercial use to extend the fruiting season.

1374.

575:633(94.3)

Investigation of horticultural and other problems.

Qd Agric. J. 1947 : 64 : 131-32.

It is reported that a new horticultural experiment station is being established at Nambour, South Queensland. The investigations envisaged include improvement work on the pineapple, citrus fruits, avocado, papaws and bananas. Another new research station is also to be established at Redland Bay, where the problems of vegetable production and testing of crops new to Queensland are to receive attention; a preliminary planting of ramie has been made.

1375.

575:633(94.3)

Annual Report of the Department of Agriculture and Stock Queensland, for the year 1945-46 (1946) : Pp. 88.

Wheat

Progress has been made in the production of new hybrid rust resistant strains; this resistance has been mostly obtained from Kenya strains, Hope and recent introductions.

Propagation plots of the two hybrids, Florence x College (3813) and Three Seas x Florence x Kenya (6041) were continued. The following new hybrids are to be tested under field conditions: Kenya Governor x Pusa x Flora, Kenya 6041 x Pusa x Flora 3202; and Seafoam x Hope x Pusa x Flora x Hope x Seafoam. New hybrid selections are also to be tested as grazing or hay wheats.

Oats

Selections of the cross Bond x Victoria x Hajira are under observation in the attempt to produce a variety combining the qualities of Algerian with rust resistance.

Sorghum

A trial of six strains of Wheatland and six of Kalo sorghum is reported. Two strains of Wheatland, 11-7 and 11-8, have been bulked as strains W1 and W2, respectively.

Hybrid material is under observation. The group of Shallu hybrids and back-crosses studied contained material with the very open type of panicle of the Shallu parent, but only in a few cases was this character combined with low plant height suitable for mechanical harvesting. A number of selections combining the Shallu type of head and medium tallness were, however isolated. If suitable dwarf types are not obtained from these crosses, the medium tall selections will be back-crossed to a dwarf parent. Other crosses, in particular Wheatland x Betty, Kalo x Day Milo, and Day Milo x Schrock, have provided promising selections suitable for mechanical harvesting.

Cotton

Further progress in the improvement of Miller is reported from the Biloa Regional Experiment Station. The mass-selected Lot 42 has been multiplied for testing on a commercial scale. Progenies showing increased lint percentages have been secured; the parent stock of these progenies, designated M1B 43-9, is being multiplied for large scale testing. Progress has also been achieved in developing jassid resistant strains by selection of Miller, and by hybridizing this and other commercial varieties with jassid resistant cottons which are otherwise of no value for cotton production in Queensland. New strains of Miller under test show promise of combining a high degree of jassid resistance, longer lint and high yielding capacity; new Miller hybrids have been secured which give promise of outyielding the strains selected from Miller. Hybrids between a jassid resistant type and Lone Star, New Mexico Acala and Triumph have also shown a high degree of jassid resistance.

The promising new strains of Lone Star, L.G. 34, 39-4-1 and Lot 25, are to be multiplied and further tested.

Several new strains of Triumph suitable for various districts in Queensland have been isolated. A new strain of Quella cotton, particularly suitable for the poorer sandy forest soils, is under trial. The Rowden 40-6 F.3 variety continues to give satisfactory results.

Papaw

Breeding is in progress.

Pineapple

Selection work has been begun at the Maroochy Experiment Station.

Grape

Trials of *Phylloxera* resistant stocks are being established. In a variety trial, the Chaouch, White Wax, Gros Colman and Servant varieties gave good yields.

Tomato

The most promising hybrids so far obtained in breeding work at the Kamerunga Experiment Station include Grosse Lisse in their parentage.

1376. SMITH, H. C.

575:633(94.6)

Annual report of the Department of Agriculture, Tasmania, for 1945-46 (1946) : No. 19 : Pp. 21.

Cereals

Varietal trials of oats as a green feed were carried out. The English variety Resistance has given outstandingly high grain yields during a four-year period.

Single plant selections of the wheat variety Major are now in their second year in replicated trials; one of these has given a significant increase of 10% and 13% in comparison with

Major. Nine crosses of wheat with medium strength flour are under trial; four have given an average increase of 6% to 14% over Major during a period of several years. Hybrids and varieties with a high flour strength have also shown promising increases of yield. In barley trials, Golden Archer was superior in yield and quality to the other two varieties tested.

Fruit and vegetables

It is briefly reported that, at New Town, breeding work was carried out on black currants, strawberries, tomatoes and beans.

*GENETICS 575.1

1377. **Genetic research in Britain, 1939-1945, a summary by various workers.** 575.1(42)

Heredity 1947 : 1 : 1-17.

Recent genetic investigations conducted at various research institutes in Britain, are reviewed, in the form of abstracts prepared for the Genetical Society Conference held in London, from 31 October to 2 November, 1945.

1378. 575.1:016(45)

BUZZATI-TRAVERSO, A.

575.1:016(43)

A bibliography of genetic research published in Italy and Germany, 1939-1945.

Heredity 1947 : 1 : 19-51.

A comprehensive bibliography is given of recent genetic investigations in Italy and Germany.

1379. 575.1:537.531:007

MITCHELL, J. S.

576.356:537.531:007

Dr D. E. Lea.

Nature, Lond. 1947 : 160 : 81-82.

This obituary notice of the late Dr Lea briefly reviews his studies on the effects of irradiations on biological systems.

1380. 575.113.4:575.113.7

LAWRENCE, W. J. C.

576.16

Studies on *Streptocarpus*. II. Complementary sublethal genes.

J. Genet. 1947 : 48 : 16-30.

The dominant genes *L* and *E* occurring in *S. Rexii* behave as complementary sublethal genes. Seedlings carrying the genes *L* and *E* show an abnormal development of the cotyledon; usually the cotyledon grows only a few centimetres long, and only a few distorted leaves are produced. The genes *L* and *E* have only been found within the species *S. Rexii*, and are derived from widely separated populations in South Africa. It has been observed that the two genes occasionally mutate to the recessive condition with approximately equal frequency, producing reverted plants, in hybrids between *S. Rexii* (*LLee*) derived from seed collected in the Knysna district of Cape Province and various garden forms carrying gene *E*; no mutations have been recorded among over 5000 plants produced by selfing *S. Rexii*. One reverted plant proved to be a chimaera of normal and sublethal tissues. One and possibly more tetraploid plants were identified among a family produced by selfing the chimerical reversion. The possible role of the genes *L* and *E* in the speciation of *Streptocarpus* is discussed; it is concluded that it is doubtful whether these genes could play a part in speciation.

1381. 575.116.1:576.356.4

FISHER, R. A.

The theory of linkage in polysomic inheritance.

Philos. Trans. 1947 : 233 : Ser. B : 55-87.

"The paper is concerned with the combinatorial and statistical problems arising in the theoretical analysis of linkage in polysomic inheritance. The second section gives a method of enumerating the heterogenic genotypes capable of being composed with given numbers of genes. In the third section these are classified in isomorphic sets, which correspond with

* General studies, see also individual crops.

the partitions in two or more dimensions of the numbers 4 and 6. The members of an isomorphic set can be generated by systematic gene substitution from any member of the set, and in consequence yield populations of gametes with equivalent frequencies.

"An aspect of the subject which has escaped attention is the multiplicity of the modes of gamete formation. Their enumeration is discussed in section 4, and leads to the specification in section 5 of the gametic matrices for the 16 sets or pairs of isomorphic sets arising in tetrasomics with two linked loci. In most cases the rank of the matrix is less than 11, so that the gametic series from the genotype concerned is deficient in respect of some of the information sought. Different sets of genotypes may be used to supplement one another's information. The final section discusses in outline the statistical problem of estimating the frequencies of modes of gamete formation from observed gametic series" [Author's summary.]

VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

1382.

DEMEREK, M.

575.243:581.04

576.356:581.04

Mutations in *Drosophila* induced by a carcinogen.

Nature, Lond. 1947 : 159 : p. 604.

Mutations have been induced in *Drosophila* after treatment with aerosol solutions of nitrogen mustard (HN2) and 1, 2, 5, 6-dibenzanthracene respectively. The latter substance also brought about chromosome breaks.

SELECTION 575.4

1383.

DUBININ, N. P. and

TINIakov, G. G.

575.41:576.356.2

Natural selection in experiments with population inversions.

J. Genet. 1947 : 48 : 11-15.

Experiments on the changes occurring during hibernation in the frequency of natural chromosome inversions in *Drosophila funebris* have shown that different caryotypes have a differential survival value.

*CYTOLOGY 576.3

1384.

PROKOFYEVA-BELGOVSKAYA, A. A.

576.312.341:576.35

Heterochromatization as a change of chromosome cycle.

J. Genet. 1947 : 48 : 80-98.

The structure and properties of the active euchromatic and inert heterochromatic regions of chromosomes are discussed. Heterochromatization is described as being characterized by (1) an increased amount of thymonucleic acid, (2) chromonemata which are often twisted into a tight spiral, and (3) a deeply staining metaphasic condition during most of the cell cycle. It is suggested that heterochromatization is a normal change in the chromosome cycle; and that it is essentially a shift of the cycle of a given chromosome region towards mitosis, characterized by a considerable acceleration of prophasic processes, resulting in the shortening of the metabolic stage of these chromosome regions. Individual chromosome regions may assume the inert heterochromatic condition long before the nucleus as a whole enters the mitotic stage.

Experiments were carried out with *Drosophila* upon the interaction of heterochromatic and euchromatic regions. In an inert region normally heterochromatic inserted into a euchromatic region, heterochromatization greatly decreases and the inserted section sometimes assumes an almost euchromatic condition, becoming indistinguishable from the neighbouring active part. In cases in which rearrangement had brought an active region close to an inert one, the heterochromatization of the inert part spread to the neighbouring active region, and the latter showed a typical heterochromatic condition; the extent of heterochromatization in the active section was also found to depend upon the relative lengths of the active and inert parts brought into proximity. The processes leading to heterochromatization are therefore reversible, and under certain conditions any chromosomal section may possess the characteristics of either euchromatin or heterochromatin.

* General studies, see also individual crops.

It is suggested that the process of heterochromatization is identical with those changes in the chromosome properties which ordinarily attend the transition of the whole nucleus from the metabolic stage to the mitotic.

Heterochromatization in a given chromosome was also found to be affected by sex, an additional short arm of the Y chromosome, the direction of crossing, the centromere, temperature, and parental age.

The results of the investigations on the influence of temperature, inert regions, the insertion of an inert section into an active region, the centromere, and parental age are compared with the effects of these factors upon crossing-over reported by other investigators, and are found to be closely parallel.

The author puts forward the view that chromosome regions which remain in the condition of heterochromatic mitotic bodies in metabolic nuclei will be "inert", for they will play only a reduced role in developmental processes. If these regions are heavily heterochromatized, it is suggested, they will probably be entirely eliminated from these processes as specific chromosome regions. When tissues and organs are being developed from cells containing such regions, an effect of physiological "loss" will be observed, and the character determined by the regions will tend to show recessive expression. A study of the heterochromatization of the *y-ac* section of chromosome in *sc*⁸ stock in the salivary gland nuclei of different categories of *Drosophila* flies revealed a strict correspondence with the types of mosaicism possessed by the different categories of flies. It is therefore concluded that the hereditarily conditioned degree of mosaicism in a given category of fly is due to the hereditary character of the cycle of the *y-ac* section. It is further suggested that the hereditary nature of the duration of the metabolic stage of this chromosome section is determined by (1) its position in the chromosome with respect to the sensitive inert region, (2) its state during the meiosis of the parents, (3) the presence in the nucleus of additional inert regions, e.g. in the Y chromosomes, and (4) its biochemical nature.

Thus the author shows that heterochromatization, mosaicism and crossing-over are of a parallel nature, since they are underlain by a common process, viz., change in the chromosome cycle, as a result of its response to changed genetical, developmental and environmental conditions.

1385. SESHACHAR, B. R. and
SRINATH, K. V.
The ciliate macronucleus.
Curr. Sci. 1947 : 16 : 83-84.

576.351:576.312.2

The presence of the large amount of desoxyribose nucleic acid in the macronucleus of the ciliates is discussed, with reference to the literature. The authors suggest that the possible occurrence of desoxyribose nucleotides in an unpolymerized condition in the partial or complete absence of protein may explain the amitosis normally shown by the ciliate macronucleus. The growth of the macronucleus, following binary fission, may be due either to the reproduction of the nucleotides already present in the daughter macronucleus, or to the passage of new nucleotides synthesized in the cytoplasm through the nuclear membrane. The authors believe that the growth of the daughter macronucleus is due to the acquisition of cytoplasmic nucleotides, and further suggest that the origin of the amitotic behaviour of the macronucleus may be ascribed to the upset of the protein-nucleic acid ratio necessary for mitotic division produced by this accumulation of nucleotides.

1386. HALDANE, J. B. S. and
LEA, D. E.
A mathematical theory of chromosomal rearrangements.
J. Genet. 1947 : 48 : 1-10.

576.356:537.531

"A theory is given of the process of chromosomal structural rearrangement following irradiation. The theory applies to nuclei in which the union of breakage ends is at random, and assumes that the number of breaks primarily produced is proportional to the dose.

"Formulae and tables are given enabling the proportion of nuclei undergoing eucentric and dyscentric types of rearrangement respectively to be calculated as a function of the dose, the cases of nuclei with 1, 2, 3, 4, 5, or many chromosome arms in the set being separately

considered. The five-arm calculation is compared with published experimental results of the irradiation of the spermatozoa of *Drosophila melanogaster*". [Authors' summary].

1387. DUSTIN, P.

576.356:581.04

Some new aspects of mitotic poisoning.

Nature, Lond. 1947 : 159 : 794-97.

A review is presented of recent work on mitotic poisons, especially in connexion with animal tissues. Special consideration is given to carbamates, cyanates, nitrogen-mustards, arsenicals and dimercaptopropanol. The effects of these substances are compared with the effects of ionizing radiations; it is suggested that the latter might either induce the formation of mitotic poisons *in situ*, or inhibit or destroy some cellular system essential for mitosis. In considering the mechanism of mitotic poisoning, the author suggests that it might be worth while investigating whether mitotic poisons act as enzyme inhibitors.

1388. CATCHESIDE, D. G.

576.356.2

The P-locus position effect in *Oenothera*.

J. Genet. 1947 : 48 : 31-42.

The genes P^+ , P^r and S of *Oe. blandina* produce a variegated phenotype when present in the interchange chromosome 3.11. When transferred to a normal 3.4 chromosome by crossing-over, these genes produce normal phenotypes. The variegation is therefore due to position effect. Linkage data for the S - P interchange break indicate that the position effect extends over an unusually long genetic distance, approximately 10 units; this distance is much longer than any genetic length reported in investigations on *Drosophila*. It is thought that the position effect depends upon the translocation of the P and S loci into proximity with heterochromation.

Various theories on the mechanism of position effect in *Oenothera* throw no further light on the problem.

1389. CATCHESIDE, D. G.

576.356.2

A duplication and a deficiency in *Oenothera*.

J. Genet. 1947 : 48 : 99-110.

A short survey is given of the occurrence of interchromosomal and intrachromosomal duplications.

A direct contiguous duplication of the P^+ - S region of interchange chromosome 3.11 in *Oe. blandina* is reported, which is evidently the result of unequal crossing-over. A corresponding deficiency in the P^+ - S region of the 3.4 and 3.11 chromosomes has also been found. Crossing-over within the duplication shows various anomalies, partly because it chiefly involves the distal segment of the duplication, and partly because crossing-over is very frequent. A study of the position effect in the duplication throws no further light upon the general problem of position effect; it confirms, however, the belief that the position effect depends solely upon the adjacent position of the genes to heterochromatin.

1390. DOBZHANSKY, T.

576.356.2:575.41

A directional change in the genetic constitution of a natural population of *Drosophila pseudoobscura*.

Heredity 1947 : 1 : 53-64.

Investigations were carried out on the changes in the frequencies of inversions in the third chromosome occurring in natural populations of *D. pseudoobscura* collected from three different locations. It was found that at two locations the observed cyclic changes in the frequencies of such gene arrangements were associated with seasonal conditions, and remained relatively constant from year to year. At the third location the frequencies of gene arrangements showed a directional trend, changing from year to year; the cyclic seasonal changes in the frequencies were small or absent. The probable rate of natural selection in producing these changes is discussed, although the specific environmental factors involved are at present unknown.

MICROSCOPIC TECHNIQUE 578.6

1391. BROWN, A. F. and JONES, W. M. 578.6
A methyl methacrylate-silica replica technique for electron microscopy.

Nature, Lond. 1947 : 159 : 635-36.

A technique is described in which electron micrographs can be obtained from silica replicas of biological materials, using methyl methacrylate as an intermediate replica.

1392. MARTIN, L. C. 578.6
Phase-contrast methods in microscopy.

Nature, Lond. 1947 : 159 : 827-30.

A general introduction is given to the theory of phase-contrast microscopy, and its possible applications to the examination of biological and other material are discussed.

*BOTANY 58

1393. LEWIS, D. 581.162.5:576.356.5:575.11
Competition and dominance of incompatibility alleles in diploid pollen.

Heredity 1947 : 1 : 85-108.

The genetic effects of tetraploidy upon incompatibility are analysed, a detailed survey being given of investigations carried out by the author and other workers on the *S* allelic systems determining compatibility relationships in *Petunia*, *Oenothera*, *Prunus*, *Pyrus* and other species.

*DISEASES AND INJURIES, BACTERIA, FUNGI 632

1394. MILLER, J. J. 632.4:575.2
The theories concerning variability in fungi.

Proc. Canad. Phytopath. Soc. 1946 : No. 14 : p. 13. (Abst.)

Hereditary differences in the fungi are considered to arise through hybridization and mutation. The hypothesis of the "dual phenomenon" postulated by Hansen attempts to account for much of the variability of the Fungi Imperfecti by assuming that variants arise as a result of the segregation of genetically different nuclei from multinucleate mycelia. The author suggests that this theory fails to explain the appearance of variants among the progeny of uninucleate haploid conidia, and that such variants must be regarded as mutants. It is also emphasized that "adaptive variation" is not in itself a mechanism for the production of new types, but should be regarded rather as arising as a result of the appearance of adapted types through mutation.

1395. SUBRAMANIAM, M. K. 632.422.3:576.35:577.15
Endopolyplidy in yeasts.

Curr. Sci. 1947 : 16 : 157-58.

The author discusses possible comparisons between the cytology of glandular cells of the "merocrine" type which pass through several cycles of secretory activity before dying, and the endopolyplidy observed in fermenting yeast cultures induced to divide by replacing the spent wort with fresh medium.

Attention is drawn to the importance of distinguishing between a growing yeast culture and a fermenting one in interpreting observations on the structure of the yeast cell.

1396. GROVES, J. W. 632.484:575.22
Variations in *Botrytis cinerea*.

Proc. Canad. Phytopath. Soc. 1946 : No. 14 : p. 13. (Abst.)

Among cultures obtained from single ascospores of *B. cinerea*, some produced mycelia without conidia or sclerotia, others produced abundant macroconidia but no sclerotia, while the remainder were intermediate in behaviour and produced some sclerotia and some macroconidia. In the light of Hansen's "dual phenomenon" hypothesis, the mycelial

* General studies, see also individual crops.

types might be interpreted as M types, the conidial types as C types, and the remainder as MC types. But the author points out that since all the variants arose from single ascospores with no possibility of heterocaryosis, the observed variation in *B. cinerea* does not support this hypothesis.

ECONOMIC PLANTS 633

1397. WARDS, H. C. A. 633:061.6
International Institute of Agriculture.
 N.Z. J. Agric. 1947 : 74 : 59-62.

An account is given of the work of the International Institute of Agriculture, Rome.

1398. FRANKEL, O. H. 633-1.557:575.42
The theory of plant breeding for yield.
 Heredity 1947 : 1 : 109-20.

The general principles of plant breeding are discussed in relation to the problem of raising the productivity of crop plants, under the headings collection and classification, species formation, intraspecific evolution, and selection and testing. A distinction is made between selection on the one hand for resistance to factors such as diseases and drought, which limit yield and are more or less recognizable in single plants and their progenies, and selection on the other hand for qualitative characters determining yield, such as number of ears per wheat plant, number of grains per ear, and weight of a single grain, which present a continuous range of variation, and are strongly influenced by the environment. The question whether selection for yield determined by the latter type of character is possible in single plants is discussed, and also, if selection is not possible, the question whether direct selection for yield in replicated yield tests is likely to be successful.

CEREALS 633.1

1399. MILLER, W. B. 633.1(94.5)
Recommended cereal varieties.
 J. Dep. Agric. Vict. 1947 : 45 : 63-66.

Notes are given on the newer varieties of wheat, such as Pinnacle and Insignia, recommended for cultivation in the various regions of Victoria. Recommendations are also given for oat varieties and hay wheats.

WHEAT 633.11

1400. 633.11(42)
Varieties of winter wheat.

Fmrs' Leaf. Nat. Inst. Agric. Bot., Cambridge 1944 : No. 8 : Pp. 4.

Brief descriptions are given of recommended winter wheat varieties suitable for milling and baking, varieties particularly suited to biscuit making, and other wheats. The leaflet includes information on the types of soil and level of fertility to which each variety is most adapted.

1401. 633.11:575(71)
Recommend new wheat for Peace River area.
 Canad. Grain J. 1947 : 2 : No. 8 : p. 19.

The new Saunders wheat variety is recommended as a replacement of Red Bobs in the Peace River region, Alberta. It has been developed from a cross between Thatcher and a selection derived from Hope and Reward. In yield it equals Thatcher and is superior to Red Bobs; it matures two to three days earlier than either variety. In baking quality it is similar to Redman, Thatcher and Red Bobs. Saunders is highly resistant to stem rust, loose smut and bunt.

1402. 633.11:575(93.1)
Work in progress at the Wheat Research Institute.
 N.Z. Wheat Rev. 1946 (1947) : 49-53.
The work of other institutions.
 Ibid. 1946 (1947) : 53-55.

A new unnamed wheat variety produced from the cross Tainui x Tuscan by the New Zealand Wheat Research Institute has outyielded Cross 7 during a five-year period. The

new wheat matures about a week earlier than Cross 7, and is similar in baking quality to this variety; it is however more susceptible to lodging. Another new unnamed variety, developed from the cross Tainui x Cross 7, has shown a baking quality equal to that of good Canadian flour and considerably superior to that of Cross 7. Both these promising varieties are under extensive test.

Among the new lines, which have shown promise in breeding work at the Wheat Research Institute, are lines from the cross Tainui x Cross 7 and a multiple cross including Cross 7 and Dreadnought in its parentage.

The establishment of a new branch station at Tai Tapu is also reported, the object of which is the breeding of wheats suitable for conditions of the highest fertility; it is hoped to produce a wheat combining the valuable characteristics of Dreadnought and Cross 7.

It is reported that investigations at the Canterbury Agricultural College on the reaction of New Zealand wheat varieties to stem weevil and Hessian fly have now been completed. Studies of the eye-spot lodging disease, including varietal susceptibility, are in progress.

1403. THOMAS, I. 633.11:575(94)
New cereal varieties in Australia.
 J. Agric. W. Aust. 1946 : 23 : 272-73.

Descriptions are given of the recently registered wheat varieties Insignia and Pinnacle (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1497).

1404. PUGSLEY, A. T. and
 HOCKLEY, S. R. 633.11:575(94.2)
Wheat variety and crossbred trials at Pallamana, 1944-46.
 J. Dep. Agric. S. Aust. 1947 : 50 : 289-91.

A report is given of trials of named wheat varieties and promising new hybrids, carried out during 1944-46 by the Waite Agricultural Research Institute.

1405. ANDERSON, J. A. and
 AITKEN, T. R. 633.11:581.6(71)
 633.16:581.6(71)
**Twentieth Annual Report of the Grain Research Laboratory,
 Board of Grain Commissioners, Winnipeg, Manitoba, 1946 (1947) :**
 Pp. 79.

Wheat

In work on the durum wheats and their value for semolina production, a milling procedure has been developed which is suitable for carrying out tests in the early stages of breeding investigations. The method requires as little as 300 gm. of wheat. A testing technique has also been developed by means of which macaroni can be processed from 50 gm. of semolina.

The macaroni making quality of the Mindum, Carleton and Stewart durum wheats was investigated during a three year period. Carleton proved to be the best of the three varieties; Stewart was slightly superior to Mindum.

In tests of new hard red spring wheats, the results obtained by use of the new "stretchometer" machine, designed to measure the extensibility of crude gluten and its resistance to extension, showed a good comparison with those obtained by dough testing machines. Milling and baking tests were carried out on 30 varieties of hard red spring wheats, 24 of which were new wheats produced by plant breeding in Canada. The varieties were evaluated on the basis of bushel weight, protein content, over all baking performance, and the physical properties of the dough. Redman (*Plant Breeding Abstracts* Vol. XVI Abst. 1053) and Rescue (*Plant Breeding Abstracts* Vol. XVII, Abst. 17) are recommended for licensing.

Tests on the quality of varieties and hybrids of durum wheat are reported. Carleton and Stewart were again classed as superior to Mindum; two other American varieties and one Canadian variety (R.L. 1642) also proved to be superior to Mindum. Only the Pelissier variety was classed as having really poor quality.

Barley

Practically all the hybrids produced in the last ten years have been characterized by low enzymatic activity. Breeders have attempted to overcome this deficiency, and in some

lines there is now a tendency towards high wort nitrogen content. The cause and effect of high wort nitrogen content therefore requires analysis. Preliminary investigations on wort nitrogen in samples of six-row, yellow and feed grades of barley are reported. The criteria used in the laboratory evaluation of malting quality are described. Plant breeders' material, types and named varieties were tested for malting quality. Montcalm was the only new barley given the status of a malting variety (cf. Abst. 463). A hybrid developed at the University of Alberta, designated H-43-10, shows promising quality, and is to receive further tests.

1406. RANJAN, SHRI 633.11:581.6:537.531:575.243(54)
The agricultural problem of India.
 J. Indian Bot. Soc. 1947 : 26 : 1-8.

In the course of this review of agricultural problems in India, information is presented on eleven mutants, R-1 to R-11 obtained by X-irradiation of the wheat variety I.P.52. The chromosome number of the mutants is the same as that of the original strain, though an alteration in the size and shape of the chromosomes has occurred in some cases. Details are given on the gluten content and yield of the varieties. R-9, which has been named Vijaya, is superior to I.P.52 in gluten content and not inferior in yield. Hybridization experiments involving the progenies of the various mutants are in progress.

1407. NEWTON, M. and 633.11-2.421.1:576.16:631.521.6(71)
 CHEREWICK, W. J. 633.16-2.421.1:576.16:621.521.6(71)
Erysiphe graminis in Canada.
 Canad. J. Res. 1947 : 25 : Sect. C : 73-93.

Information is given of the distribution on *E. graminis* var. *Tritici* and *E. graminis* var. *Hordei* in Canada.

The Black Hull-less, Chevron, Goldfoil, Heil's Hanna 3, Nepal and Peruvian varieties of barley were used in a study of the physiological races of *E. graminis* var. *Hordei* in Canada. Races 1, 3, 4, 6, 8, 9, 10, 11 and 12 were identified.

The Axmister, Chul, Huron and Norka wheat varieties were used to differentiate the physiological races of *E. graminis* var. *Tritici*. Three new races were identified, distinct from races 1 and 2 isolated in the United States; they are designated 3, 4 and 5.

The results of the seedling reactions of 246 barley varieties and strains and 124 wheat varieties and strains to inoculations of the nine races of *E. graminis* var. *Hordei* and of races 1, 2, 4, and 5 of *E. graminis* var. *Tritici*, respectively, are summarized. The effect of temperature upon the development of *E. graminis* was also investigated.

1408. UPPAL, B. N. and 633.11-2.452:576.16:631.521.6(54)
 GOKHALE, V. P.
A new race of *Puccinia graminis tritici* and two biotypes of race 42.
 Curr. Sci. 1947 : 16 : p. 61.

The identification of a new race of *P. graminis* var. *Tritici* and two biotypes of race 42 is reported. The reactions of differential wheat varieties are indicated.

1409. JOHNSON, T. 633.11-2.452:576.16:631.521.6(71)
Recent changes in the physiologic races of certain of the cereal rusts.

Proc. Canad. Phytopath. Soc. 1946 : No. 14 : p. 13. (Abst.)

Changes in the prevalence of physiological races of wheat stem rust (*Puccinia graminis* var. *Tritici*) and leaf rust (*P. triticea*), which have occurred in Canada during the last decade, are indicated. Race 56 of stem rust continues to be the more important race; race 17, which was collected only rarely before 1934 but became common in that year, is also still common. In the last two or three years, races of leaf rust have broken down the resistance of Renown, Regent and other wheats of similar origin; of these strains, race 128 is the most widely distributed. Other strains capable of attacking these wheats include biotypes of races 5 and 15.

1410.

633.13:575(71.27)

Garry oats shows up well in 1946 co-operative tests.

Canad. Grain J. 1947 : 2 : No. 8 : p. 14.

The new Garry white oat developed at the Dominion Laboratory of Cereal Breeding is to be generally released at the end of the 1947 crop year. In addition to being resistant to all known races of stem rust in Canada, the variety is crown rust and smut resistant; it is medium early and has strong straw. Garry was produced from the cross Victoria x Vanguard.

1411.

HOWARD, H. W.

633.13:576.354.4

Meiotic irregularities in hexaploid oats. I. Univalent frequencies in spring x winter variety hybrids of *Avena sativa*.

J. Agric. Sci. 1947 : 37 : 139-44.

"Meiosis was studied in pollen mother cells of the following F_1 hybrids: Victory x Avoine d'hiver, Victory x Grey Winter, Argentine x Avoine d'hiver, Victory x Argentine and Avoine d'hiver x Grey Winter.

About 20% of the pollen mother cells of the spring x winter variety hybrids contained univalents as compared with about 1% in the spring x spring, and winter x winter variety hybrids.

It is suggested that these univalents are due to two or more chromosomes in spring and winter types of oats being only partially homologous.

It is suggested that this univalent formation in the F_1 hybrids may account for other meiotic irregularities observed in selections from spring x winter crosses in oats."

[Author's summary].

1412.

633.13.00.14(41.5)

Results of oat variety trials.

Mon. Rep. Minist. Agric. N. Ire. 1947 : 22 : 9-10.

Trials of the following oat varieties are reported: Stormont Arrow, Stormont Iris, Stormont Grandee, Crown, Elder and Utility.

MAIZE 633.15

1413.

LUDBROOK, W. V.

633.15:575.12(94)

A yield trial of top crosses between a Victorian strain of Funk's Yellow Dent maize and twelve American inbreds.

J. Aust. Inst. Agric. Sci. 1946 : 12 : 139-41.

In yield tests of top-crosses between 12 American inbred lines of maize and Funk's Yellow Dent at Canberra, two of the top crosses produced yields 34% and 21% higher respectively, than those of the open-pollinated varieties Funk's Yellow Dent and Krug used as controls. It is suggested that high-yielding top crosses between existing inbreds and local open-pollinated varieties may be valuable as possible substitutes for single and double cross hybrids in those maize growing districts in Australia where the acreage grown does not justify a full-scale programme of hybrid breeding.

1414.

SHARMAN, B. C.

633.15:581.143.26.035.1(42)

Short nights : an unappreciated hindrance to maize cultivation in England.

J. R. Hort. Soc. 1947 : 72 : 195-202.

The cultivation of maize in England is discussed, with reference to the photoperiodic requirements of different types and strains. The author suggests that it is possible to grow in northern England long-day tolerant types, such as the early maturing Golden Cross sweet corn or dent and flint types with medium maturity, to the point of producing good cobs. The requisite number of leaves produced by these types before flowering is initiated is comparatively low or moderate; and it is suggested that these types can be successfully cultivated, if various cultural measures are taken so that the early stages of growth are passed through as rapidly as possible, and the plants thus reach the critical date of changing over from the vegetative to the reproductive phase before the days become too long and the rate of leaf production is correspondingly reduced.

BARLEY 633.16

1415. JOHNSTON, W. H. 633.16:575(71.27)
License Vantage barley; may replace Plush.

Canad. Grain J. 1947 : No. 8 : p. 10.

The new Vantage barley is described (cf. Abst. 981). It is mentioned that crosses between this variety and Titan are under investigation, with a view to incorporating smut resistance in Vantage.

1416. RAW, A. R. 633.16:575(94)
Some aspects of barley breeding.

J. Aust. Inst. Agric. Sci. 1946 : 12 : 142-44.

Objectives of barley breeding in Australia are discussed.

1417. 633.16:581.6:061.6(71)
Brewing and malting industries announce formation of Barley

Improvement Institute.

Canad. Grain J. 1947 : 2 : No. 11 : p. 18.

Information is given on the Barley Improvement Institute of Canada to be established at Winnipeg. The new Institute is to be sponsored and financially supported by the Canadian brewing and malting industries, and it will co-ordinate breeding work, the testing of malting barley, and other activities concerned with barley improvement.

1418. LEJEUNE, A. J. 633.16-2.452-1.521.6:575

A note on the reaction of certain barley varieties to race 15B of stem rust (*Puccinia graminis* *Tritici* Erikss. and Henn.).

Sci. Agric. 1947 : 27 : 183-85.

Barley varieties and hybrids were tested for the reaction of the adult plant to race 15B and other races of stem rust. The reactions of all the 28 varieties tested to race 15B and to the other stem rust races were essentially similar. Out of the 41 hybrids investigated, 35 contained the Peatland barley in their parentage and had been previously selected for resistance to stem rust races other than 15B. These 35 hybrids showed substantially the same reaction to 15B as they did to the other races. The results indicate, therefore, that adult plant reaction to race 15B is controlled by the same gene or genes determining adult plant reaction to the other races of stem rust. In both the Peatland and Chevron varieties reaction to stem rust is conditioned by the same single gene. If these two varieties, and possibly other known resistant barleys, are being used in breeding for stem rust resistance, the work need not be interrupted in order to add separate resistance to race 15B.

FORAGE GRASSES 633.2

1419. 633.2:575(48.5)

JULEN, G. 633.3:575(48.5)

Some problems arising in the breeding of herbage plants in Sweden.

J. Brit. Grassland Soc. 1947 : 2 : 57-62.

This article is based on a paper read at a meeting of the British Grassland Society in London, December, 1946. It gives an account of the following investigations at present receiving attention in Sweden: the production of good local strains of red clover; the problem of seed setting in red clover, with particular reference to the length of the corolla tube as a factor affecting pollination by humble and honey bees; hybridization of lucerne with wild yellow lucerne (*Medicago falcata*) to improve the seed setting capacity of lucerne under Swedish conditions; the problems of improving *Poa pratensis*, in view of its apomictic mode of reproduction; and the possibility of obtaining valuable tetraploid strains of red and alsike clovers.

1420. GREGOR, J. W. 633.24:576.312.35:581.5(41)

***Phleum alpinum* L. emend. Gaud. and *P. commutatum* Gaud.**

Trans. Bot. Soc. Edinb. 1946 : 34 : 368-70.

The mountain timothy of Scotland is a tetraploid ($2n = 28$) and should be named *Ph. commutatum* Gaud. *Ph. alpinum* L. emend. Gaud. is a diploid ($2n = 14$), restricted, as far as is known, to Central Europe.

1421.

633.284(94)

***Phalaris tuberosa*.**

Commonw. Agric. 1947 : 17 : 62-66.

The use of *Ph. tuberosa* in Australia is described; it is mentioned that selection work has resulted in the production of three improved strains, of which the strain known as G. B. 81 is considered to be the best.

LEGUMINOUS FORAGE PLANTS 633.3

1422. STEVENSON, T. M. and

BOLTON, J. L.

633.31:581.162.3(71)

An evaluation of the self-tripping character in breeding for improved seed-yield in alfalfa.

Emp. J. Exp. Agric. 1947 : 15 : 82-88.

In experiments at Saskatoon, the seed yields of single crosses between the F_1 and F_2 selfed progenies of self-tripping selections of Grimm lucerne were determined, the flowers being emasculated before crossing. The F_1 selfed plants gave significantly higher yields than the control plot of Grimm, except in the case of two single crosses. Wide differences in combining ability were observed.

Diallel crossing between the selfed progeny of self-tripping plants was also carried out, crosses being made between progenies derived from different selections. The hybridization was effected by hand but without emasculation. In all, 68 crosses were tested, with the Grimm and Ladak varieties as controls. In addition, a series of 77 diallel crosses was obtained from open-pollinated plants selected for high cross-fertility, which did not possess the self-tripping character. Pollination was also carried out by hand without emasculation in this group. It was found that the highest seed-yielding single crosses involving self-tripping parents were little if any better in seed yield than the highest yielding seed-yielding single crosses between non-self-tripping plants, although the parent plants of the self-tripping group were all selected from inbred lines with superior seed yield. A similar range of combining ability was shown by the two groups of crosses.

Experiments on the extent of natural cross-pollination occurring in self-tripping plants indicated that most of the seed produced under conditions of open pollination was the result of self-fertilization.

An investigation was also made of two synthetic strains developed under spatial isolation from self-tripping plants. One strain, designated F.F., was made up of six selections with superior pod-setting capacity; the other, designated S.F., consisted of 16 selections, six of which were the same as those used in the production of F.F. The S.F. synthetic strain consistently outyielded the control Grimm variety, but the F.F. synthetic gave a performance similar to that of Grimm. It is suggested that the ten extra selections included in S.F. were either less self-tripping or more self-sterile, or both, than the six selections common to both synthetic strains, thus increasing the proportion of cross-fertilized to selfed seed.

The general conclusion is reached that self-tripping, self-fertile lucerne plants are undesirable as breeding material for improving the seed yield. It is, however, suggested that self-tripping selections could be utilized, provided selection is carried out for self-sterility and cross-fertility, and the use of honey bees to effect cross-fertilization in such selections is advocated. A preliminary test has shown that cross-fertilization occurred in lucerne if foreign pollen was applied one hour and possibly longer after tripping where no emasculation was practised.

1423. BIRD, J. N.

633.321:575(71.4)

Red clover improvement in Quebec.

Agriculture 1946 : 3 : Pp. 8. (Macdonald Coll. J. Ser. No. 216).

Red clover breeding at the Macdonald College, Quebec, is described. In the preliminary selection work it was found that a high proportion of the most promising lines were derived from material originally from Orel and Silesia. An early type, named Dollard, and a late type tentatively designated Late M.C., have been derived from these selections. The Dollard red clover, seed of which was first distributed in 1941, possesses superior yielding ability, winter hardiness and disease resistance.

1424. WILLIAMS, W. 633.321:581.162.5:575.11
Genetics of red clover (*Trifolium pratense* L.) compatibility. II.
 (a) Homozygous self-sterile $S_x S_x$ genotypes obtained as a result of pseudo-fertility; (b) self-fertility.
 J. Genet. 1947 : 48 : 51-68.

It has been previously reported that in a very low percentage of cases in *T. pratense* L. certain pollen tubes carrying the same *S* factor as that carried by the female parent are able to penetrate the full length of the stylar tissue and effect fertilization. In such cases of pseudo-fertility, otherwise self-sterile and cross-sterile pollinations produce a few viable seeds. On the hypothesis that sterility in *T. pratense* depends upon the allelomorphic series of oppositional *S* factors, the progeny produced as a result of pseudo-fertilization from an individual possessing the factors S_1 and S_2 , for example, would be expected to contain the genotypic classes $S_1 S_1$, $S_1 S_2$ and $S_2 S_2$ in the ratio of 1 : 2 : 1. Groups of plants obtained as a result of pseudo-fertilization were tested for their relationships of self and cross fertility. The four homozygous genotypes $S_1 S_1$, $S_2 S_2$, $S_3 S_3$ and $S_4 S_4$ were isolated, and the sterility factors S_1 , S_2 , S_3 and S_4 were shown to be allelomorphs of the same series of factors conditioning sterility.

It was also previously reported that the plant 344 (1) 263 and its progeny were self-fertile. The present paper further reports that the second and third generation progenies obtained by selfing of 344 (1) 263 were fully fertile. In addition, further crossing experiments have shown that the original self-fertile plants were of the genetic constitution $S_7 S_a$, and that the S_7 factor for self-fertility behaves as a true allele of the *S* series of factors conditioning sterility.

1425. WILLIAMS, W. 633.321:581.162.5:575.11
Genetics of red clover (*Trifolium pratense* L.) compatibility.
III. The frequency of incompatibility *S* alleles in two non-pedigree populations of red clover.
 J. Genet. 1947 : 48 : 69-79.

Investigations begun in 1932 on the number of *S* allelomorphs governing incompatibility in red clover are reported. Crosses were made between 25 plants chosen at random from commercial populations of English late-flowering red clover and a plant known to have the genetic constitution $S_3 S_3$ (cf. Abst 1424). Pollen carrying the S_3 factor was fully functional on the styles of 24 out of the 25 plants. The F_1 progeny of each of the 24 fertile crosses were classified by the use of tester sibs into $S_3 S_x$ and $S_3 S_y$ genotypes. The expected ratio of 1 : 1 between these two sterility genotypes was obtained. The 48 plants possessing either the genotype $S_3 S_x$ or $S_3 S_y$ were intercrossed in all possible combinations to test fertility relationships. The data obtained indicated that out of the 48 allelomorphs conditioning sterility which were carried by the original 24 plants, 41 were different.

Similar investigations were carried out on 20 plants of English broad red clover. These plants were pollinated by S_1 pollen; 18 of the crosses showed full fertility. Fertility tests were made on the 38 S_x and S_y alleles isolated from F_1 families obtained by crossing the $S_x S_y$ plants with $S_1 S_1$ plants; a plant with the genotype $S_1 S_2$ and another plant with the genotype $S_1 S_x$ were also included in the intercrossing tests. Out of a total of 40 unknown *S* alleles, 37 were found to be different.

ROOTS AND TUBERS 633.4

1426. BLACK, W. and DRIVER, C. M. 633.491:575(43)
Potato breeding.
 British Intelligence Objectives Sub-committee, London 1946: Final Rep.
 No. 1248, Item No. 22, Trip No. 2606 : Pp. 31. (Mimeographed.)

This report on potato breeding in Germany contains three sections: (1) the reports on each of the eight targets in the order in which they were visited, (2) a survey of the potato breeding work as a whole, and (3) a summary on the organization of potato breeding. Section 2 surveys breeding investigation under the following headings: virus diseases; blight (*Phytophthora infestans*); Colorado beetle; wart disease; scab; frost resistance; *Alternaria*; blackleg; and other characters.

Vereinigte Saatuzchten, Ebsterf bei Uelzen.

This is a commercial seed growing association, founded in 1928 but developed from the co-operative efforts of farmers in the district since 1907. Four new varieties bred by the association have been approved, viz: Vera, a first early variety with yellow flesh; Bona, a mid-season potato with yellow flesh, good flavour, and a high degree of resistance to virus diseases; and Mensa and Heida, late yellow-fleshed varieties with very good flavour.

It is reported that the most popular varieties grown in the British Zone are Ackersegen, Bona, Flava, Mittelfrühe, Voran and Vera.

Breeding investigations are being carried out to combine in new varieties as many as possible of the following characteristics: immunity to leaf roll, mosaic, *Phytophthora*, Colorado beetle, wart and scab; drought resistance; high yielding capacity; satisfactory tuber shape and flesh qualities; short stolons; uniform and medium sized tubers; and high starch content. The production of virus resistant varieties is considered to be the most urgent problem in breeding.

Immunity from virus diseases is the ultimate objective, but at present a moderate degree of true resistance in the field is regarded as satisfactory. Certain selections exhibit a high degree of resistance to both leaf-roll and mosaic. The breeding of hypersensitive types has not been considered.

Solanum demissum has been used in breeding for blight resistance. Little success has been obtained in breeding types resistant to frost or the Colorado beetle; *S. chacoense* and *S. demissum* have been utilized in the breeding for beetle resistance.

Botanisches Institut der Provinzialforschungsanstalt für medizinische und landwirtschaftliche Biologie, Celle, Hanover.

Originally the Institute was located at Berlin/Dahlem. Its main work is concerned with the physiology and genetics of resistance to virus diseases.

A new technique for diagnosing leaf-roll infection is reported. The plants to be tested are infected by the usual method of aphid transmission. After three weeks, cross-sections of the stem are made, preferably just below the node, and the sections are stained with carbyl fuchsin. The phloem cells which have been killed by the leaf-roll virus are stained red. In addition, the dead cells fluoresce under ultra-violet light. The degree of susceptibility of the plant to the virus is said to be directly correlated with the extent of the damage in the cells. The Y virus was considered to be second in importance; work on the mechanism of resistance and selection for resistance were said to be in progress. Three strains of Y virus have been identified.

The test used for virus A consists of sap inoculation to *S. demissum*. The intensity of dark brown necrotic spotting appearing on the leaves after a few days is considered as indicative of the degree of resistance.

A certain amount of work is also being carried out on the K (Kräusel) virus; this virus is the American virus E.

No work is being done on the field immunity reaction to virus diseases.

It is reported that the Flava and Bona varieties show resistance to Y and A viruses, and some resistance to leaf-roll. The Aquila potato is resistant in virus Y and the common strain of blight; it also exhibits some leaf-roll resistance.

Kaiser Wilhelm Institut für Züchtungsforschung, Voldagsen bei Hameln.

In view of the unsuitability of the soil conditions at Voldagsen for potato cultivation, breeding work is carried out at the substations at Scharnhorst and Rosenhof.

Breeding work is in progress on other crops as follows: wheat-rye hybrids, *Triticum-Agropyron* hybrids, maize, cocksfoot, timothy, *Phalaris*, sweet clover, *Trifolium repens*, *Vicia Faba*, sweet lupin, *Medicago*, rape, kohlrabi, sunflower, castor oil, *Datura*, sweet pepper, apples and other fruit trees, strawberries, gooseberries, blackcurrants, soya bean and dwarf beans.

Kaiser Wilhelm Institut für Züchtungsforschung, Scharnhorst über Neustadt.

The main aims of potato breeding work are resistance to blight, leaf-roll, viruses X, Y and A, Colorado beetle and frost.

The majority of first year and older seedlings in hand involve wild potato species, e.g. *S. demissum*, *S. acaule* and *S. chacoense*, in their parentage. In Germany, 32 strains of blight have been recognized, but only eight of these are considered to be of major importance by an investigator interviewed at this substation. Certain varieties of *S. demissum* are resistant to all strains. Several promising hybrid seedlings possessing this species in their parentage have proved resistant to five of the eight major strains.

It was noted that seedlings were described as resistant to blight and the virus diseases without reference to the degree or type of resistance. In the case of blight, the term "resistance" implied that the plants were immune from at least one strain of the disease, and were therefore classified, in the general sense, as resistant. Resistance to the virus diseases implied only some degree of field resistance at this research centre. The hypersensitive type of resistance to viruses A and X, known in Britain as field immunity, has not been exploited.

Breeding for Colorado beetle resistance has not met with success. The resistant character of *S. chacoense* has become dissipated with each successive generation when back-crossed to commercial varieties.

S. chacoense has been utilized in breeding for frost resistance. A seedling selected in the fourth back-cross generation was capable of resisting 2–3° C. of frost for a short period, but when that temperature was sustained it succumbed. This selection was not altogether satisfactory in its yielding capacity and tuber size.

Biologische Zentralanstalt für Land- und Forstwirtschaft, Berlin/Dahlem.

The institute is now mainly concerned with the control of plant diseases and pests in the Russian zone.

The potato collection is still maintained.

Only two varieties, Fram and Fondana, together with a number of unnamed seedlings, have shown immunity from a new biotype of wart disease (*Synchytrium endobioticum*) found in Thuringia.

Deutsche Saatzuchtgesellschaft, Berlin.

Contact was made with Professor Müller. Since the seed-growing region of Pomerania has been transferred to Poland increased attention must be given to virus resistance. Müller is endeavouring to obtain absolute resistance to streak, absolute resistance to mosaic, and relative resistance to leaf-roll.

Selections for resistance are secured by growing varieties to be tested with alternate rows of infected plants, and studying the rate of spread of virus in the field. Differences in varietal resistance are not considered to be due to preference of aphids for particular varieties, but due to the difficulty of infecting some varieties.

Use is being made of *S. demissum* in breeding for resistance to Colorado beetle. Only a few seedlings have been isolated which possess appreciable resistance; none of these has so far proved commercially satisfactory.

Bayerische Landessaatzuchtanstalt, Weißenstephan/Freising.

Breeding varieties resistant to viruses and blight is the chief objective. Resistance to Colorado beetle is also receiving attention.

In recent years the institute has developed the following new approved varieties: Falke, Monika, Roswitha, Robusta, Tiger and Panther. All are described as immune to the common strain of blight. Robusta is claimed to be leaf-roll resistant, and Panther resistant to viruses in general.

The species chiefly used in breeding for blight resistance is *S. demissum*; the blight resistance of selections of this species and the virus resistance of commercial varieties have been combined by appropriate back-crossing. Forms which show resistance to the greatest number of blight strains receive most attention.

Tests for blight resistance are carried out on both leaves and tubers; the tuber test used is that devised by Müller.

Breeding for virus resistance proceeds on lines similar to those at other German research institutes, those varieties least affected by virus diseases in the field under normal growing conditions being utilized as parents.

The Polish variety Switez is reputed to be resistant to viruses A, X and Y; it has been used widely in breeding. The new blight resistant variety Robusta is said to be leaf-roll resistant.

The results of breeding for resistance to Colorado beetle are similar to those obtained at other institutes, difficulty being encountered in combining good yielding capacity and resistance. Use has been made of both *S. demissum* and *S. chacoense*. Preliminary work on breeding for frost resistance, using *S. demissum*, has been carried out.

The American varieties Katahdin, Sebago, Chippewa, Cobbler and Green Mountain are not considered to be suitable for Bavarian conditions as the rainfall is insufficient; types with smaller leaves are preferred, since this character is correlated with drought resistance.

Kaiser Wilhelm Institut für Züchtungsforschung. Rosenhof, Ladenburg/Neckar.

Breeding for resistance to Colorado beetle is one of the main aims of investigations. The resistance of *S. chacoense* has been found to behave as a recessive character, a fact which introduces considerable difficulties in breeding work. Intercrossing of resistant seedlings instead of repeated back-crossing to cultivated varieties has been studied. Types with fairly large tubers and short stolons have been secured; but much remains to be done in improving the level of productivity and other essential characters. Certain varieties of *S. chacoense* are said to possess resistance to both blight and Colorado beetle; these are being used in breeding.

1427. BARNELL, H. R. and GREENHAM, D. W. P. 633.491:581.6(42)
The effect of variety and source on the quality of dehydrated potatoes.

Chem. Ind. Lond. 1947 : No. 23 : 315-18.

Varietal differences in susceptibility to blackening were observed in dehydration tests. The tendency to blacken was also found to be related to soil type. The main crop varieties tested included King Edward, Majestic, Golden Wonder, Kerr's Pink, Arran Banner, Arran Victory, Gladstone and Red King; the early varieties studied included Epicure, Ninetyfold, Arran Pilot, and "new" potatoes of several varieties. The general conclusion reached is that the majority of the varieties are capable of yielding a reasonably satisfactory product, but in most cases they are not consistently free from blackening. Potatoes of the King Edward variety grown on silt land gave the best quality dehydrated product. The Gladstone variety appears to be almost as satisfactory as King Edward.

1428. MATTHEWS, R. E. F. 633.491-2.8:576.16:631.521.6
Status of potato virus B.

Nature, Lond. 1947 : 159 : 713-14.

Cross-absorption tests with Up-to-Date streak and virus B from Duke of York suggest that virus B is not a single entity, and that the strains included in it do not deserve any special status within the X group of viruses to which they belong.

1429. **Potato variety trials.** 633.491.00.14(41.5)

Leaflet. Min. Agric. N. Ire. 1947 : No. 7 : Pp. 12.

Varietal trials carried out during the period 1937-46 at Stormont are reported. The leaflet deals particularly with the more recently introduced varieties, most of which have been bred by Clarke at Ballycastle, Co. Antrim. Notes are included on the following recently introduced varieties: Ulster Chieftain, Arran Pilot, Di Vernon, Ballydoon, Dunbar Rover, Arran Peak, Gladstone, Dunbar Standard, Ulster Cromlech, Ulster Earl, Stormont Dawn, Ulster Premier, Ulster Ensign, Ulster Leader and Ulster Supreme.

1430. SATYANARAYANA RAO, N. 633.492:576.312.35:576.354.4
Chromosome studies in the genus *Ipomaea*.
 Curr. Sci. 1947 : 16 : p. 156.

Mitotic investigations showed that *I. carnea*, *I. pulchella* and *I. reptans* have a chromosome number of $2n = 30$. The diploid number of *I. Batatas* was found to be 90.

In investigations of meiosis, 15 bivalents were observed in both *I. carnea* and *I. pulchella*.

At diplotene the bivalents showed both terminal and interstitial chiasmata. In *I. carnea*, secondary association was in general observed among the bivalents. The haploid number of *I. Batatas* was established as 45. Syndiploid pollen mother cells were recorded in *I. carnea* and *I. pulchella*.

FIBRES 633.5

1431. MAHTA, D. N. 633.51(54)
Cotton growing in India.

Indian Cott. Gr. Rev. 1947 : 1 : 1-9.

An historical account is presented of cotton production and improvement in India.

1432. HUTCHINSON, J. B. 633.51:575
Letters to a critic. 1. Can the cotton breeder please the spinner?
 Emp. Cott. Gr. Rev. 1947 : 24 : 96-100.

The problems of varietal and environmental variation in cotton production are discussed.

1433. AFZAL, M. and
 NAWAZ, S. M. 633.51:575(54)
The staple characteristics of the Punjab-American cotton crop.
 Indian Cott. Gr. Rev. 1947 : 1 : 22-25.

The staple characteristics of the Punjab-American cottons are discussed.

1434. SETHI, B. L. 633.51:575(54.3)
Review of work done on cotton in the U.P.
 Indian Cott. Gr. Rev. 1947 : 1 : 34-38.

The work of developing improved varieties of indigenous and American cotton in the United Provinces is surveyed.

1435. AFZAL, M. 633.51:575(54.5)
Research on cotton in the Punjab. II. American cotton.
 Indian Fmg 1946 : 7 : 341-45.

An historical account is given of breeding work on American cotton in the Punjab.

1436. AFZAL, M. 633.51:575(54.5)
Problems in cotton improvement in the Punjab.
 Indian Cott. Gr. Rev. 1947 : 1 : 50-59.

An account is given of the production of desi cotton (*Gossypium arboreum* var. *neglectum* f. *bengalensis* Hutch. et Ghose) and American cotton (*G. hirsutum*) in the Punjab. The six different ecological zones are defined; and a map giving these tracts and the position of the cotton research substations is included. The problems of producing and breeding varieties of both species are discussed with reference to yield, improvement in ginning out-turn, increased staple length, and resistance to root rot, angular leaf-spot, spotted and pink boll worms, jassid and white fly.

1437. DORASAMI, L. S. 633.51:575(54.5)
Review of work done on cotton in Mysore.
 Indian Cott. Gr. Rev. 1947 : 1 : p. 39.

The work of breeding improved strains of American cottons suitable for cultivation in Mysore is described.

1438. KHADILKAR, T. R. 633.51:575(54.7)
Breeding of high ginning Jarila cotton.
 Indian Cott. Gr. Rev. 1947 : 1 : p. 64.

Since 1937, the improved Jarila cotton has been increasingly used in the Khandesh tract, Bombay Province; it is also widely grown in the adjoining territory of the Central Provinces and Berar. Jarila is highly resistant to wilt and gives an average yield of 300-500lbs of seed cotton per acre. It has a staple length of $\frac{5}{8}$ to $\frac{7}{8}$ in. and is suitable for spinning 25-40s highest standard warp counts; the average ginning percentage is 35.

Hybridization between Jarila and N.R. 5 was effected in 1937; the latter cotton has a high ginning percentage of 45. Three synthetic cultures obtained from the cross, viz., 197-3, 403-5 and 670-4, give a 2-4% higher ginning out-turn and 15-20% increase in yield in comparison with Jarila; in other characteristics they are similar to Jarila.

New crosses of 197-3 and 670-4 with 9-2-8-3, a Dokras selection possessing a longer staple and higher spinning value than either 197-3 or 670-4, are now under investigation. In addition, a cross has been made between the F_1 of the hybrid 670-4 x 9-2-8-3 and N.R. 5 to secure further improvement in ginning percentage.

1439. PATEL, G. B. 633.51:575(54.7)
Cotton improvement in South Gujerat (Bombay Province).
 Indian Cott. Gr. Rev. 1947 : 1 : 19-21.

An historical account is given of the work of developing improved local cotton varieties (*Gossypium herbaceum*) for the south Gujerat region.

1440. PAVATE, V. C. 633.51:575(54.7)
Cultivation of Jayavant cotton in the Bombay Province.
 Indian Fmg 1946 : 7 : 392-94.

A general account is given of the Jayavant (Victorious) cotton grown in the Bombay Province. This variety was developed by crossing Dharwar-1 and the wilt-resistant Dharwar-2 in 1922. The Dharwar-1 and Dharwar-2 cottons were obtained by pure line selection of the Kumpta variety.

1441. DHARMA RAJULU, K. 633.51:575(54.8)
Introduction of Cambodia cotton in the Ceded districts of Madras Province.
 Indian Cott. Gr. Rev. 1947 : 1 : 84-86.

Improvement work on the existing indigenous cotton varieties in the Ceded Districts of Madras Province has shown no further progress during the past 15 years. Work on American cottons has therefore been carried out. The Indian Central Cotton Committee has sanctioned a five-year programme of investigations, the objects of which are to develop (1) a long stapled American variety giving good yields when grown as an irrigated winter crop, and (2) a type suitable for cultivating in the unirrigated regions not served by the Tungabhadra irrigation scheme. Trials of American varieties are carried out at Siruguppa, Hagari and Nandyal, under the typical conditions of three distinct regions, viz. irrigated black soil, unirrigated black soil subject to variable rainfall, and unirrigated black soil characterized by heavy rainfall and an early season. The preliminary results of trials at Siruguppa indicate that American varieties can be successfully cultivated as a winter crop, and that the Hyderabad-American cotton, H.A. 11., gives the most consistent performance as regards yield and quality. H.A. 11 is also adaptable, and it has a low percentage of bad kapas, and a spinning capacity of up to 40s high standard warp counts in spite of its medium staple length. The trials under unirrigated conditions at Hagari and Nandyal suggest that it will be possible to breed a type suitable for cultivation under these conditions from the material obtained from other Provinces.

1442. KHURSHID, A. B. H. 633.51:575(54.9)
Review of work done on cotton in Hyderabad.
 Indian Cott. G. Rev. 1947 : 1 : 40-42.

Cotton breeding in Hyderabad is reviewed.

1443. BALASUBRAHMANYAN, R. and 633.51:581.466:581.02(54.8)
 RANGASWAMI, T. V.
Contabescence of anthers in the American cottons grown at the Agricultural Research Station, Palur (Madras Province).
 Indian Cott. Gr. Rev. 1947 : 1 : 28-29.

The environmental factors conducive to contabescence of the anthers in cotton are discussed with reference to the effect of the condition upon boll setting and dehiscence, productivity and seed germination. Varieties were found to differ in their reaction to the environment and hence in the extent of the contabescence of their anthers.

1444. 633.51:581.6(54)
Indian Central Cotton Committee. Annual Report of the Director, Technological Laboratory, for the year ending 31 May, 1946 : Pp. 35.

A report is included of fibre and spinning tests on (1) agricultural samples of cotton received

from the Agricultural Departments of the Provinces and States; (2) standard Indian cottons (cf. Abst. 491); (3) trade varieties (cf. Abst. 492); and (4) of fibres tests on small samples of various cottons.

1445. GULATI, A. N. 633.51:581.6(54)
Neppiness in Indian cotton yarns.
 Indian Cott. Gr. Rev. 1947 : 1 : 60-63.

The analysis of neppiness in Indian cotton yarns representing varieties of *Gossypium hirsutum*, *G. herbaceum*, and *G. arboreum* var. *neglectum* is reported. Six different types of neps have been distinguished. Several suggestions are made as to ways in which neppiness can be reduced, including the elimination of strains of cotton containing excessive amounts of immature hairs, and the use of hard-seeded and more mature cottons.

1446. SEN, D. L. 633.51:581.6(54)
Technological reports on trade varieties of Indian cottons, 1946.
 Technol. Bull. Indian Cent. Cott. Cttee 1946 : No. 65 : Ser. A. Pp. 100.

The results are presented of the 1946 spinning tests on samples of 38 representative commercial varieties of Indian cotton, and three varieties of African cotton, A. R. Busoga, A. R. Jinja and A.R.B.P.52. The introduction includes a survey of the different varieties sampled in the tests since they were first carried out on the 1929-30 crop.

1447. 633.51:581.6:537.531:575.243(54)
What the scientists are doing. X-ray treatment of cotton seed.
 Indian Fmg 1946 : 7 : 360-61.

Details are given of experiments carried out at the Institute of Plant Industry, Indore, on treating the seed of M.U.4 with X-rays, which have resulted in the production of a new cotton variety with a higher ginning percentage and greater fibre length than M.U.4.

1448. IYENGAR, R. L. N. 633.51:581.6:578.08(54.7)
A new method for finding the diameter of cotton fibres.
 Indian Cott. Gr. Rev. 1947 : 1 : p. 32.

A rapid photoelectric method of determining the diameter of cotton and other fibres is described; the method is suitable for use in cotton breeding work in which selection for fineness of fibre is an objective.

1449. GADKARI, P. D.,
 DEO, K. G. and
 NADKERNY, N. T. 633.51-1.531.12:575.148(54)
Studies in the genetic consistency of Gaorani 6.
 Indian Cott. Gr. Rev. 1947 : 1 : 65-76.

Experiments were carried out to determine whether there was any degeneration of the Gaorani 6 cotton (*Gossypium arboreum* var. *neglectum* f. *indica* H. et G.) during the course of its multiplication from the second to the seventh generations. The strain maintained its performance with regard to the following characters: viability, plant vigour and pest resistance, height, yielding capacity, earliness, weight of 100 seeds, staple length, fibre weight, swollen hair diameter, fibre maturity and spinning performance. The ginning percentage showed a slight tendency to be reduced as the result of a decrease in the number of fibres per seed; but this reduction was statistically significant in one year only, and was never sufficiently high to reduce the value of the crop of seed cotton at the time of purchase.

1450. KNIGHT, R. L. 633.51-2.3-1.521.6:575.116.1.061.1
The genetics of blackarm resistance V. Dwarf-bunched and its relationship to B_1 .
 J. Genet. 1947 : 48 : 43-50.

In the course of breeding work carried out to produce blackarm resistant American Upland cottons, crosses were made between Nye's Uganda B31 and the Sudan variety 514. A number of dwarfed "bunched-up" plants appeared in the F_2 of this cross. The data from various crosses show that normality as opposed to the "dwarf-bunched" character depends upon either of two duplicate genes, designated D_a and D_b . The genotype of dwarf-bunched plants is $d_a d_a d_b d_b$, that of variety 514 is $D_a D_a d_b d_b$, and that of Uganda B31

$d_a d_a D_b D_b$. The gene D_a is fully dominant, while D_b produces an intermediate heterozygote. The heterozygote $d_a d_a D_b d_b$ shows a range of variation from the dwarf to the normal condition. The gene d_a is very closely linked with the gene B_1 for blackarm resistance, or is possibly identical with B_1 . The gene d_b has also been found in Gambia Native (*G. hirsutum* var. *punctatum*) and in the American Upland varieties Uganda SP84, XA129 and Deltapine, but it was not present in all the Upland varieties studied.

1451. AFZAL, M. and ABDUL GHANI, M. 633.51-2.7-1.521.6:575(54.5)

Cotton jassid in the Punjab.

Indian Fmg 1946 : 7 : 407-10.

Investigations carried out at Lyallpur during the last eight years on various aspects of the problem of jassid attack are reviewed.

The varieties 4F, LSS, 289F/43 and 199F have proved to be more resistant than the 124F and 289F/K-25 cottons.

Since it is now known that reaction to jassid attack is associated with the nature of the leaf vein, the site of oviposition, a detailed study of the various characteristics of the leaf vein was undertaken. Hairiness was found to be the most important character concerned in jassid resistance. Selection for hairiness is therefore recommended. A very high genetic linkage between hairiness and physiological resistance was demonstrated in a study of hybrid progenies. It was, however, observed that a few cross-over plants occurred; this small percentage of cross-over plants explains the fact that some very hairy plants are nevertheless susceptible to jassid attack.

1452. GREGORY, P. J. and ISHAQUE, M. 633.51.00.14(54.1)

Cotton prospects of Bengal.

Indian Cott. Gr. Rev. 1947 : 1 : 26-27.

Experiments on the suitability of short staple cotton (*Gossypium arboreum* var. *neglectum* f. *bengalensis*) and the long staple Upland American and Egyptian Sea Island cottons for cultivation in Bengal are described.

1453. 633.523:575(54)

Progress of technical schemes.

Bull. Indian Cent. Jute Cttee 1947 : 9 : 462-63.

It is reported that three strains of *Corchorus olitorius* which have outyielded the Chinsurah Green strain by 20-30%, have been developed by the Jute Agricultural Research Laboratories.

SUGAR PLANTS 633.6

1454. 633.61:575(54)

What the scientists are doing : New Co canes.

Indian Fmg 1943 : 4 : p. 364.

In the past the Co.400 and Co.500 series of sugar-canes have represented the tropical and sub-tropical types respectively. It has been decided to include both types in one continuous series, and accordingly the new Co. canes for 1943 begin from Co.601. The parentages and general characteristics of these canes are summarized in a table.

1455. HUGHES, C. G. 633.61:575(94.3)

The remarkable expansion of Q. 28.

Cane Gr. Quart. Bull. 1946 : 10 : 22-23.

An account is given of the sugar-cane variety, Q.28, developed at the Mackay Station from the cross Co.290 x Q.1098. It is a hardy, vigorous cane, which ratoons well and is fairly drought resistant. Q.28 is resistant to gumming and Fiji disease and moderately resistant to mosaic and downy mildew. It has given considerably higher yields of cane and sugar per acre than the standard canes.

1456. KING, N. J. 633.61:575(94.3)

C.P.29/116 and Q.49 in South Queensland.

Cane Gr. Quart. Bull. 1946 : 10 : 24-26.

Notes are given on the recently distributed sugar-cane varieties, C.P.29/116 and Q.49.

C.P.29/116 was imported from Florida. Q.49 was developed at the Bundaberg Station from a cross between P.O.J.2878 and Co.290. Q.49 strikes and ratoons well, and is widely adapted; it shows good standing ability, and is resistant to gumming, Fiji and downy mildew diseases. In yield of sugar Q.49 has compared favourably with P.O.J.2878.

1457. YUSUF, N. D. 633.61:581.143.26.035.1:581.145.1(54.8)

The effect of long periods of darkness on flowering in *Saccharum spontaneum* Sorapara, 270.

Curr. Sci. 1947 : 16 : p. 62.

Further experiments on the induction of flowering by photoperiodic treatment of *S. spontaneum* have been carried out, with a view to controlling flowering for breeding purposes (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 566).

1458. McMARTIN, A. 633.61-2-1.521.6(68)

A review of the present sugar-cane variety and disease position.

Proc. 20th Congr. S. Afr. Sug. Tech. Ass. 1946 : 73-76.

The incidence of various diseases on the chief sugar-cane varieties grown commercially and at the Mount Edgecombe Experiment Station in South Africa during recent years is surveyed.

Information is included on the newly released variety N : Co.310 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 561). In trials at the Experiment Station and on outside quarantine stations, N : Co.310 has shown no appreciable susceptibility to any important disease. It appears to be fairly resistant to leaf spot fungi. No cases of streak and mosaic have been reported. It germinates well, and is resistant to fungi causing sett deterioration. N : Co.310 is, however, less resistant to red rot than Co.281; but it has shown some degree of resistance to natural infection. The variety also appears to possess a hardy root system.

1459. K...., H. G. 633.61-2.7-1.521.6(94.3)

Resistance of Eros to grub attack.

Cane Gr. Quart. Bull. 1947 : 10 : p. 117.

A note is given on the relative resistance of the Eros sugar-cane to grub attack observed in plantings on various soils in the Innisfail district, Queensland (cf. Abst. 1462).

1460. SINGH, HARBANS
MOHAMMAD, KHUSHI and
SINGH, HARDIAL

633.61.00.14(54.5)

Sugarcane and wheat in one year.

Indian Fmg 1943 : 4 : 358-61.

The new sugar-cane Co.396, which has a very early maturity, produces considerably higher yields than the local katha cane in the Punjab. Its cane can be crushed in October. Co.396 is highly resistant to pyrilla attack. It also possesses considerable resistance to fungous diseases, frost and drought; in years of pyrilla attack it outyields even Co.313. Co.396 is, however, susceptible to top borer. It is also slow to germinate.

1461. WIGHTMAN, G. M. and

RYLE-DAVIES, W.

633.61.00.14(72.92)

Annual report of the Agronomy Section of the Research Office of the Sugar Manufacturers' Association (of Jamaica) Ltd.

J.A.S.T. Quart. 1946 : 10 : No. 2 : Pp. 75.

The results of the yield survey of sugar-cane varieties grown on Jamaican estates during the period 1945-46 are summarized.

The experimental investigations reported include small scale varietal trials in 6 or 8 replicates, known as the 16 × 6 or 16 × 8 variety sorting tests; the 49 × 4 preliminary varietal trials harvested as first ratoons; and large scale variety tests. On the basis of the results of all the varietal trials it is recommended that B. 3439 and B. 34104 should be maintained as standard commercial canes. It is also recommended that the use of Co.419 and Co.421 should be extended to cover 1% of the sugar cane acreage, to obtain data on their performance under commercial conditions. B.37172 is recommended for known wet areas or irrigated estates, while B.37161 is considered to be suitable as an alternative

variety to B.34104 to a limited extent. The elimination of the following varieties from the estates is suggested: varieties of the B.37 series with the exception of B.37194, B.37172, B.37193 and B.37194, varieties of the B.38 series with the exception of B.38192, and of all varieties in series prior to the B.37 series, with the exception of B.34104, B.3439 and B.35187. Experiments on the effect of spacing and of the time of reaping on varietal yields are also reported.

1462. SLOAN, W. J. S. 633.61.00.14(94.3)
Varietal trials, 1945 and 1946 seasons.
 Cane Gr. Quart. Bull. 1947 : 10 : 133-42.

The sugar cane trials conducted at various farms in Queensland during 1945-1946 are reported. The following varieties were included: Eros, Trojan, P.O.J. 2878, Comus, A147, 38-8560, H.Q. 426, Cato, Badila, C.P. 29/116, Co.290, Q.44 and several other Q canes.

STIMULANTS 633.7

1463. 633.71:575(71.3)
Progress report of the Dominion Experimental Substation, Delhi, Ontario 1937 to 1945.
 Dep. Agric. Dom. Canada 1947 : Pp. 16.

It is mentioned that the tobacco breeding programme at the Dominion Experimental Substation, Delhi, Ontario, is mainly concerned with the development of flue-cured varieties resistant to black root rot.

The results of tests of White Mammoth, Yellow Mammoth, Gold Dollar and Duquesne, during the period 1938-45, are summarized in one section of the bulletin. Notes are also included on the performance of Bonanza, White Stem Orinoco, and Virginia Wrapper, under conditions in Ontario.

1464. HASLAM, R. J. 633.71:575(71.3)
Another new variety of burley released at Harrow.
 Lighter, Ottawa 1947 : 17 : p. 12. (Mimeographed).

The release of a new burley tobacco variety Harmony, by the Dominion Experimental Station, Harrow, Ontario, is reported. It has been developed from a cross between Harrow Velvet and Halley's Special. Harmony is somewhat similar to the Haranova burley variety in type, but produces a more richly coloured leaf of very fine texture. The stalk is smaller than that of Haranova, a characteristic which should prove advantageous in handling and curing. The variety is highly resistant to black root rot.

1465. MOFFETT, A. A. 633.71:576.354.4:576.356
The cytological basis of variation in varieties of *Nicotiana Tabacum*.
 Trans. Roy. Soc. S. Afr. 1945 : 30 : 235-43.

Meiosis was studied in the following varieties or strains with a view to determining the cytological causes of morphological variability in *N. Tabacum*: Jamaica Wrapper, White Stem Orinoco, Ambalema, Vumba and Meadows Giant; Jamaica Wrapper x Ambalema; White Stem Orinoco x Ambalema; White Stem Orinoco x Vumba; and Ambalema x Vumba. In all the varieties and strains investigated, the chromosome number was found to be $2n = 48$. At meiosis 24 bivalents were formed, except in a small number of cells in which some indirect evidence was obtained of the occurrence of multivalents. The bivalents exhibited secondary association in metaphase I, the maximum association observed being 4 groups of 3 bivalents and 6 groups of 2 bivalents. This observation suggests an original basic chromosome number of $x = 12$. The identification of occasional univalents at metaphase I further suggests that a small amount of allosyndesis probably occurs in *N. Tabacum*. In the later stages of meiosis, chromatin bridges were observed; in the majority of cases no accompanying fragment could be detected. On the basis of comparable observations reported in other plant species, the formation of these bridges is interpreted as being due to crossing-over in relatively inverted segments of chromosomes; and it is suggested that the fragments are lost in the general body of the chromosomes or are simply too small to be identified. The bridges produced at second anaphase, caused by the

formation of a proximal chiasma disparate to the chiasma in the inversion, occurred less frequently than the bridges observed at anaphase I.

The probable genetical results of structural hybridity are discussed. The author suggests that occasional allosyndesis, and the less extreme chromosome aberrations, such as addition or loss of small portions of chromosomes, which have little effect upon fertility on account of the allotetraploid constitution of *N. Tabacum*, produce the majority of "mutant" types. It is pointed out that many commercially valuable characters in tobacco are inherited on a polygenic basis, and on this account are markedly influenced by environmental conditions. As a result of primary or secondary chromosome re-arrangements due to structural hybridity the unbalancing of polygenic combinations probably occurs with the release of variability. The need to eliminate environmental variation as far as possible in breeding work is stressed, in view of the possibility that hereditary variation may be easily confused with environmental fluctuation. Attention is also drawn to the possibility that, particularly under Rhodesian conditions, where solar radiation is intense, chromosome aberrations are constantly being produced.

1466. MARSH-SMITH, E. C. 633.72:581.165.72:575.42(54.6)
Vegetative reproduction.
 Tea Quart. 1947 : 18 : 107-11.

An account is given of the selection of the bushes carried out by the author under estate conditions in Ceylon. Bushes selected by eye were split into three groups, now designated DSB1, DSB2, and DSB3, each with a distinctive leaf type. The bushes were studied for yield and plant type. DSB1, the highest yielding type, has a very long leaf, pronounced spreading habit, and close set plucking points.

In general, the yield varied not only with the size of the bush but also with the density of the plucking points. Bushes have now been selected as seed bearers from this material.

Recent observations suggest that the old method of testing yields is unnecessary, and that selection based upon observations of the following characters is satisfactory: general good condition of the bush; jat; the density of the plucking points; spreading habit; the capacity of cuttings to strike readily; tea quality; and disease resistance. The author considers that the use of single internode cuttings is the most satisfactory method of vegetatively propagating selected bushes.

1467. 633.72-1.535.4(54.6)
Tea selection. III. The vegetative propagation of selected bushes.
 Tea Quart. 1946 : 18 : 91-94.

Preceding articles dealt with the methods of selecting mother tea bushes (cf. Abst. 505); the present article deals with the vegetative propagations of coffee selections, by the use of small cuttings each bearing a single leaf, derived from young shoots of the mother bush. Recent work has indicated that, provided this method is restricted to suitable clones which root easily, the method is suitable not only for experimental work but also for estate conditions.

1468. THOMAS, A. S. 633.73:575(67.61)
The cultivation and selection of *robusta* coffee in Uganda.
 Emp. J. Exp. Agric. 1947 : 15 : 65-81.

An account is given of the production of *robusta* coffee (*Coffea canephora* Pierre) in Uganda with reference to its old established cultivation, the first developmental work carried out by the Department of Agriculture, selection and breeding experiments at the Kawanda Station, methods of tree training, and the future prospects of the crop.

1469. 633.73:575(67.8)
Twelfth Annual Report of the Coffee Research and Experiment Station, Lyamungu, Moshi 1945 (1946) : Pamphl. No. 44 : Pp. 14.

The work of conversion to the multiple stem method of growing was continued, by the removal of the remaining parts of the old single stem trees.

The results of the seedling selection trials planted in 1938 are summarized for the year under

review, which was apparently an "off" year for yield. F selections, however, derived from Kents Coffee continued to give a relatively good performance. In comparative experiments of 16 seedlings and clones, the clones have so far exhibited superiority.

1470. THOROLD, C. A. 633.73-1.421(67.62)

A study of yields, preparation out-turns, and quality in Arabica coffee. Part I. Yields.

Emp. J. Exp. Agric. 1947 : 15 : 96-106.

Crop recording experiments on individual trees of *Coffea arabica* in plots on an estate in Kenya are reported, which were part of an investigation on a die-back disease. Individual tree records are used to indicate the degree of variability; this variability was found to be greater when the crops were in general small.

In an analysis of yield differences of "Mysore" coffee trees, those with wide leaves gave significantly higher yields than trees with narrow leaves. The mean yields of the bronze tipped and green tipped types were not significantly different.

Biennial bearing is shown to be an important factor affecting yield data. A quantity, I, is suggested for expressing the intensity of biennial fluctuation.

The desirability of using a combination of two or more seasons' yields is emphasized, in view of the individual tree and seasonal variation.

The statistical results provide information useful in planning field experiments. They indicate that approximately 20 trees per plot in seven replicates of each treatment may be expected to demonstrate differences of the order of 20% when the combined yields of two or more seasons are used.

1471. DALE, W. T. 633.74-2.472.3-1.521.6

Witches' broom disease investigations. XII. Further studies on the infection of cacao pods by *Marasmius perniciosus* Stahel.

Trop. Agriculture, Trin. 1946 : 23 : 217-21.

The results of experiments on the artificial inoculation of cacao pods with *M. perniciosus* are reported, and descriptions are given of the disease symptoms produced by natural and artificial infection. From a study of Trinitario cacao (I.C.S. 1) and Brazilian Forastero cacao (Maranhão), it was observed that the infection shown by the fruits of both varieties decreased after a length of about 7 cm. was reached; after a period of further pod development complete immunity to the disease was reached. It is suggested that a study of the morphological and physiological changes occurring in young fruits at this apparently critical stage with regard to infection by *M. perniciosus* might provide some information on the reported differences in susceptibility to pod infection shown by certain I.C.S. clones.

1472. BAKER, R. E. D. and

DALE, W. T.

633.74-2.8:576.16:631.521.6(72.98)

Notes on a virus disease of cacao.

Ann. Appl. Biol. 1947 : 34 : 60-65.

Experiments are reported on a virus disease of cacao, discovered in Trinidad in 1943. The disease appears to be confined to the north-western region of Trinidad, and the symptoms resemble those of West African swollen shoot. No swellings are formed, but the disease may cause die-back and reduced yields. Investigations on I.C.S. clones have shown that two closely similar strains, designated A and B, are present. No varieties appear to be immune to this disease or to act as symptomless carriers.

1473. SALMON, E. S. and

BURGESS, A. H.

633.79:581.6(42)

Reports received from brewers on recent brewing trials with certain new varieties of hops: II.

J. Inst. Brew. 1947 : 53 : 100-10.

The reports are given of brewing trials carried out by ten firms on eight of the new hop varieties developed at Wye College.

AROMATIC PLANTS 633.8

1474. HUBBARD, C. E. 633.812.42:582(91)

Malayan grasses.

Kew Bull. 1941 : No. 1 : 24-25.

The new species *Cymbopogon calcicola* from the Malay Peninsula is described.

OIL PLANTS 633.85

1475. HARLAND, S. C. 633.853.55:575.11.061.5:575.41(85)

An alteration in gene frequency in *Ricinus communis* L. due to climatic conditions.

Heredity 1947 : 1 : 120-25.

A study was made of the effect of the climate in the Lima area, Peru, upon the factor *B* for the presence of waxy bloom on the stem and its allelomorph *b* for the absence of waxy bloom. Observations were carried out on natural populations of *R. communis*, a large-seeded type with bloom from Brazil which was homozygous for *B*, a small-seeded type without bloom from the Peruvian coastal area homozygous for the factor *b*, and crosses and back-crosses between these two types. It was found that the parent plants and progenies carrying the *B* factor were unable to fruit in the damp, cold winter of this region. Plants with the *bb* genotype continued to produce fruit during the winter but at a reduced rate. The proportion of plants with the *B* gene occurring in wild populations in the Lima area was approximately 0.15%, suggesting that this genotype has been numerically much reduced since the introduction of various types into this part of Peru. It was further noted that the proportion of plants bearing *B* increased with increasing altitude and the concomitant increase in the amount of sunlight and decrease in the fog. The data obtained therefore show that under the conditions of the specialized climate in the coastal region of Peru, natural selection has favoured plants with the constitution *bb*.

MEDICINAL PLANTS 633.88

1476. HILLS, K. L. and

KELENYI, G. P.

633.88:581.6:575.42(94)

A preliminary report upon the cultivation of *Duboisia* spp.

J. Coun. Sci. Industr. Res. Aust. 1946 : 19 : 359-75.

An account is given of experiments on the cultivation of *D. myoporoides* and *D. Leichhardtii* in progress at Canberra and Nambour, which suggest that commercial cultivation of these alkaloid-bearing trees is practicable. As the result of selection work the existence of a number of distinct morphological and biochemical genotypes have been isolated; and it is hoped that types will ultimately be secured with a desirable alkaloid content which will be constant under different environmental conditions; yield tests of lines which will produce hyoscyamine under almost any conditions are now in progress.

1477. FERNIE, L. M.

633.885.1-1.535

The vegetative propagation of cinchona by cuttings.

E. Afr. Agric. J. 1947 : 12 : 228-36.

Methods of vegetatively propagating species of *Cinchona* are surveyed.

RUBBER PLANTS 633.91

1478. BANNAN, M. W.

633.913:576.356.5:581.04:581.4(71)

Tetraploid *Taraxacum kok-saghyz*. III. Achene weight, flowering and plant development.

Canad. J. Res. 1947 : 25 : Sect. C : 59-72.

Previous papers have dealt with the production of tetraploid plants of kok-saghyz by colchicine treatment, and the characteristics of parental and F_1 tetraploids in comparison with diploid plants (cf. *Plant Breeding Abstracts* Vol. XVI, Absts. 86 and 1552). The present paper describes the results of investigations on the weight of achenes and plant size in tetraploids and diploids, and the relationships between various morphological characters. The weight of the achene was not found to be an important factor affecting the ultimate size of the plant, when grown in pots or under conditions of wide spacing in the field. It is suggested, however, that where competition exists in close spacing, the size of the achene may be a more important factor, since the early growth of seedlings produced from large

achenes sometimes exceeded that of seedlings grown from small achenes, especially in the case of diploids. In general, mature tetraploid plants possessed larger plant parts than the diploids, but the increase in size was offset by decrease in number. The tetraploids usually matured shortly after the diploids, and in the first year of growth they produced a markedly lower proportion of flowering plants and heads per plant. Flower and seed production appeared to exert an inhibiting influence upon root formation, and since the tetraploids produced fewer inflorescences during the first year, the size of their roots tended to surpass that of the diploids, unless the latter plants are disbudded. In general, first year plants with the broadest and leafiest rosettes, and few or no flowers, tended to have the largest roots.

FRUITS AND NUTS 634

1479. ROGERS, W. S. and
GARNER, R. J. 634(43)
Report on fruit plant nurseries and fruit research stations in western Germany and the German official fruit plant certification scheme.
British Intelligence Objectives Sub-Committee, London 1945 : Final Rep. No. 1072, Item No. 22, Trip, No. 1515 : Pp. 17. (Mimeographed).

The report on fruit investigations in western Germany is divided into three sections, viz. (1) fruit plant material in the three areas: Weser/Ems, Kreis Pinneburg, near Hamburg, and the North Rhine Province; (2) research on fruit growing at various research stations, including a sub-section on the present trends of rootstock records, and (3) the German scheme for the certification of nursery products.

Brief reference is made to varieties of tree and bush fruits, grapes and walnuts.

1480. GRANT, E. P. 634.11:577.16(71)
Apples as a source of vitamin C.
Sci. Agric. 1947 : 27 : 162-64.

In the analysis of 338 apple varieties and seedlings, wide variations in vitamin C content were recorded; 19 varieties and seedlings contained more than 15 mg. of vitamin C per 100 gm. The following varieties were high in this group: Tony Crab, Red Tip Crab, Wapella, Gertrude and Transparent x Wealthy. The breeding value of varieties rich in vitamin C but otherwise unsatisfactory as eating apples is emphasized.

1481. BALL, E. 634.11:581.6(42)
Cider orchard restoration in Herefordshire.
J. Minist. Agric. 1947 : 54 : 107-11.

The need for the increased production of apples for the cider industry in England is stressed. An account is given of the varietal introductions and trials carried out by the firm of Messrs H. P. Bulmer and Co. Ltd on cider apples, including bush cider trees, and of the work of Messrs Bulmers' orchard restoration scheme which has been in existence for 20 years. The use of suitable perry pear varieties is also discussed.

1482. MARLOTH, R. H. 634.441(68)
The mango in South Africa : I. Soil and climatic requirements, and varieties.
Fmg. S. Afr. 1947 : 22 : 457-63.

A general account is given of mango growing in South Africa. The commercial varieties at present cultivated in the Union, and varieties introduced in recent years and now under experimental observation, are discussed. Notes are included on the four main varieties cultivated commercially, viz., Sabre, Peach, Long Green and Kidney. Observations on pollination and fruit setting are also discussed.

1483. MOUAT, H. M. 634.451(93.1)
A progress report on a collection of Japanese persimmons (*Diospyros kaki* L.f.) at Mount Albert, Auckland.
N.Z. J. Sci. Tech. 1946 : 28 : Sect. A : 94-96.

An account is given of 17 varieties of Japanese persimmon. Wide varietal differences in growth, leaf characteristics, fruit drop and fruit type have been noted.

1484. GROSZMANN, H. M. 634.653(94.3)
Fruit culture. Avocado varieties.
 Qd Agric. J. 1947 : 64 : 8-12.
 Avocado varieties under observation in Queensland are discussed.

FORESTRY 634.9

1485. 634.9:575(54)
The Forest Research Institute. Forest Research in India and Burma 1944-45 : Pt 1 : Pp. 149.

It is reported that investigations on the inheritance of various characters in *Terminalia crenulata*, the inheritance of the capacity in *Pinus longifolia* to yield high resin content, the inheritance of climatic racial characters in Indian teak, and the inheritance of physiological racial characters in *Butea frondosa* and *Schleichera trijuga* were continued.

The work of the Chemistry and Minor Forest Products Branch included the analysis of *Rheum* sp. for chrysophanic acid as a substitute for chrysarobin, the analysis of *Cinnamomum* spp. for their oil content as a substitute for imported clove oil, and investigations on the vegetable tanning resources of India.

VEGETABLES 635

1486. WARK, D. C. 635.34(94)
Some observations on the magnitude of agronomic variation within cabbage varieties and a description of varieties.
 J. Coun. Sci. Industr. Res. Aust. 1946 : 19 : 347-58.

Marked differences in growth between different strains of the same cabbage variety are reported, as a result of experiments carried out at Canberra. Descriptive notes are given on important varieties.

1487. WARK, D. C. 635.34:575.42(94)
A method of selection within a variety of cabbage.
 J. Aust. Inst. Agric. Sci. 1946 : 12 : 150-52.

The methods of bulk selection and single plant selection within the Succession cabbage variety were compared in trials at Canberra and Griffith, under conditions climatically unsuitable for the commercial cultivation of most strains of the variety. The results indicated the value of single plant selection in securing an improved strain, particularly under conditions similar to those under which the strain will be subsequently cultivated.

1488. 635.52-1.524(94.4)
Great Lakes lettuce. A useful imported variety.
 Agric. Gaz. N.S.W. 1947 : 58 : p. 61.

In extensive trials in New South Wales, the American lettuce variety, Great Lakes (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 658), has given good results. In particular, it has shown freedom from bolting.

1489. HOWARD, H. W. 635.561:581.141:576.356.5:575.127.2
Seed size in crosses between diploid and autotetraploid *Nasturtium officinale* and allotetraploid *N. uniseriatum*.
 J. Genet. 1947 : 48 : 111-18.

Seed development and seed size were studied in all possible crosses between *N. officinale* ($2n = 32$), the colchicine induced tetraploid of *N. officinale*, and *N. uniseriatum* ($2n = 64$) and in the selfs of these two species and the tetraploid *N. officinale*. The tetraploid form of *N. officinale* has a seed fertility of about 44% of the diploid. In all cases good development of the fruit and the development of a high percentage of ovules were observed. Good seed, however, was only produced by the three selfings and the two crosses, tetraploid *N. officinale* x *N. uniseriatum* and *N. uniseriatum* x diploid *N. officinale*. The crosses, diploid *N. officinale* x *N. uniseriatum* and *N. uniseriatum* x autotetraploid *N. officinale*, produced large empty seeds, while the cross diploid *N. officinale* x tetraploid *N. officinale* and its reciprocal gave small empty seeds. The tetraploid seeds weighed 138% of the weight of diploid *N. officinale* seeds. The results are explained on the basis of the relation between the embryo and endosperm, and it is suggested that the single genome of *N. uniseriatum* has a "physiology of seed production" intermediate between those of diploid *N. officinale* and

tetraploid *N. officinale*. The author compares his observations on seed development in *Nasturtium* with those obtained by himself and other investigators in experiments on *Brassica*.

1490. CHAKRAVARTY, H. L. 635.61/3:582

Studies on Indian Cucurbitaceae.

Indian J. Agric. Sci. 1946 : 16 : 1-90.

Taxonomic descriptions are given of the species of Cucurbitaceae occurring in India and Burma, with information on their geographical distribution and economic uses.

1491. WALKER, W. F. 635.62.00.14(94.6)

Cucurbit investigations.

Tasm. J. Agric. 1946 : 17 : 335-41.

Trials of pumpkins and marrows have been begun with a view to determining which varieties are most suitable for growing in Tasmania. Preliminary notes are given on 12 varieties.

1492. 635.64:575(71.4)

New tomato variety.

Canad. Grain J. 1947 : 2 : No. 8 : p. 14.

The development of a new tomato variety, Quebec Five, by the Deschambault Farm School, Quebec, is briefly reported. The variety, whose origin is not given, is early maturing, with a smooth bright red skin.

1493. HALLSWORTH, E. G. and LEWIS, V. M. 635.64:577.16(94.4)

Some factors affecting the ascorbic-acid content of tomatoes in New South Wales.

Emp. J. Exp. Agric. 1947 : 15 : 132-47

The ascorbic acid content of tomato fruit was studied in several varieties in relation to the following factors: storage, stage of fruit and bush maturity, the light energy received previous to harvesting, total weight of fruit produced per bush, mean fruit weight per bush, position of the fruit on the clusters, intravarietal and intervariatal variation, leafiness and fruit size of different varieties, and locality. In all the varieties analysed, a marked variation from bush to bush in ascorbic acid content was obtained; significant intervariatal differences were also recorded, although the influence of locality proved to be more important than that of variety.

1494. Ross, A. A. 635.64:578.08

Studies of growth correlations in the tomato.

Qd J. Agric. Sci. 1946 : 3 : 121-56.

Convenient methods are given for the determination of the dry weight of the vegetative parts of the tomato plant, the leaf area and the fruit weight, without interfering with the growth of the plant.

1495. ABERDEEN, J. E. C. 635.64-2.3-1.521.6(94.3)

Experiments in the control of bacterial wilt of tomatoes in south-eastern Queensland.

Qd J. Agric. Sci. 1946 : 3 : 87-91.

Trials of varietal resistance to *Xanthomonas solanacearum* (E.F. Sm.) Dowson are reported.

1496. MILLS, M. and HUTTON, E. M. 635.64-2.484-1.521.6(94).

***Fusarium* wilt of tomato in Australia. 1. The relationship between different isolates of the pathogen and resistance in varieties of *Lycopersicon esculentum* Mill. and other *Lycopersicon* species.**

J. Coun. Sci. Industr. Res. Aust. 1946 : 19 : 376-86.

Greenhouse experiments on the susceptibility of *Lycopersicon* spp. and a number of commercial tomato varieties to *Fusarium bulbigenum* var. *Lycopersici* are reported; field observations on the occurrence of *Fusarium* wilt on 12 commercial varieties are also recorded. Evidence was obtained suggesting that strains of the fungus with differing pathogenicity occur in Australia, but that the differences in pathogenicity are not substantial. Under both greenhouse and field conditions Pan America proved to be highly resistant. Lines of *L. pimpinellifolium* and one line of *L. peruvianum* also exhibited a high degree of resistance.

Part II. Foreign

*STATISTICS 519

1497. COCHRAN, W. G. 519.24
Some consequences when the assumptions for the analysis of variance are not satisfied.
 Biometrics 1947 : 3 : 22-38.

The consequences are considered when the following four assumptions for the analysis of variance are not satisfied: (1) that the treatment effects and environmental effects are additive, (2) that the experimental errors are all independent, (3) that the experimental errors have a common variance, and (4) that the experimental errors are normally distributed.

1498. EISENHART, C. 519.24
The assumptions underlying the analysis of variance.
 Biometrics 1947 : 3 : 1-21.

In this discussion of the assumptions underlying the analysis of variance, emphasis is laid on the two distinct classes of problems involved, viz. (1) the detection and estimation of fixed relations among the means of sub-sets of a universe of objects, and (2) the detection and estimation of components of random variation associated with a composite population. Two mathematical models dealing respectively with these two classes of problems are studied, in the first of which the parameters are population means, and in the second, components of variance.

1499. WALSH, J. E. 519.24
Concerning the effect of intraclass correlation on certain significance tests.
 Ann. Math. Statist. 1947 : 18 : 88-96.

Consideration is given to the effect of intraclass correlation on the confidence coefficients and significance levels of confidence levels and significance tests derived under the assumption that the values obtained by sampling from the same normal population are independent.

1500. JACOB, W. C. 519.24:631.421
Análise estatística de experimentos fatoriais. (Statistical analysis of factorial experiments).
 Bol. Minist. Agric. Rio de J. 1944 : 33 : 41-56.

Analyses of variance have been worked out for a $2 \times 2 \times 2 \times 2$ pattern with four replications, a $3 \times 3 \times 3$ pattern with three replications, and a $6 \times 3 \times 4$ pattern with three replications.

1501. SUKHATME, P. V. 519.24:631.421:633.1
The problem of plot size in large-scale yield surveys.
 J. Amer. Statist. Ass. 1947 : 42 : 297-310.

Experiments with wheat and rice in India have shown that a serious danger of over-estimating yields results from the employment of small plots. No bias was ascertainable when plot size exceeded 1/80th of an acre (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1469).

1502. DIJKVELD STOL, J. J. 519.24:633-1.557
Oogstformuleering. (Formulae for yield).
 Landbouwk. Tijdschr. Wageningen 1942 : 54 : 726-38, 798-817.

The author considers the relation of yield (y) and rate of manurial application (x) in fertilizer experiments. From Mitscherlich's Law of Diminishing Returns, $y = Y [1 - \exp(-kx)]$ he derives by expansion the quadratic yield law which he puts into the form $Y - y = f(x - X^2)$, where Y is the maximum yield attainable, X is the rate producing this yield

* General studies, see also individual crops.

(optimum rate,) and the quantity f , which in this country is called the quadratic effect, is a measure of the decrease in the additional response Δy to a unit of extra rate $\Delta x = 1$, as the basic rate (x) approaches X . Most of the paper is concerned with numerical and graphical methods of calculating the quantities Y , X and f , and these are illustrated with examples followed by a discussion of quantitative accuracy. The methods are, however, both more cumbersome as well as statistically less efficient than the orthogonal least square fit practised in this country. H. O. H.

*BREEDING 575

1503.

575:633(47)

In Scientific Institutions.

Agricultural Chron., Moscow 1946 : No. 11 : 9-12. (Mimeographed).

1. *A vine-growing Research Institute.* p. 9.

It is reported that a grape growing research institute was founded two years ago near Samarkand; from the experimental station previously established here, a collection of about 150 grape varieties and over 5000 hybrid seedlings was taken over. New varieties have been raised, of which the white and black seedless varieties are the most important. The fruit are two to three times the size of ordinary grapes and have a high sugar content. These varieties produce raisins of good quality.

2. *Activity of the U.S.S.R. Plant Husbandry Institute in 1947.* p. 10.

The following objectives of the Institute of Plant Husbandry are briefly reported: the production of improved winter wheats for the Leningrad area, higher-yielding hard wheats for the Krasnodar region, early ripening oats and barley varieties for the extreme North, and stable winter ryes and wheats for the Urals; the production of new clover, lucerne and vetch varieties, and early maturing blight-immune potato varieties; the testing of melons from Central Asia and Moldavia; and the continuation of investigations on the development of agriculture in the extreme North and in the desert and semi-desert regions.

3. *Fifteenth anniversary of the Tajik State Selection Station.* p. 10-11.

The Tajik State Selection Station, serving the districts of the Ghissar Valley and Kulyab region, has developed several new varieties of field crops, improved many local and selected varieties by selection and hybridization, and conducted investigations on resistance to drought, lodging and disease.

5. *Fifteenth anniversary of the Michurin Institute.* p. 11.

The Mičurin Fruit and Vegetable Institute celebrated its fifteenth anniversary in November 1946. It has trained over 1000 agricultural specialists since its foundation.

6. *New Department of the Ukrainian Academy of Sciences.* p. 11-12.

The Ukrainian Academy of Sciences has inaugurated a new department of agricultural sciences, composed of five institutes. The Institute of Genetics and Selection is studying the theoretical foundations of modern methods of selection.

1504. MOSOLOV, V.

575:633(47)

New achievements of Soviet agricultural science.

Soviet News 1947 : No. 1693 : p. 4.

A brief account is given of recent work carried out at the institutes of the Lenin Academy of Agricultural Sciences.

At the Odessa Selection and Genetics Institute, the new Ukrainka spring wheat and new spring barleys obtained by vernalizing winter barleys have exceeded the standard varieties in yield.

Rehabilitation work on the World Collection brought together by Vavilov at the Leningrad Institute of Plant Cultivation continues.

Lysenko reports some successes in transforming spring wheats into winter forms at the Siberian Institute of Grain Farming.

Fruits with high vitamin C contents have been obtained from hybrids of apple x hawthorn and pear x hawthorn at the Mičurin Central Genetic Laboratory.

* General studies, see also individual crops.

1505.

575:633(47.1)

633.00.14(47.1)

Försöksresultat från Finska Mosskulturföreningens försöksstationer år 1938. (**Experimental results from the Experimental Stations of the Finnish Association for the Reclamation of Bogland, 1938**).

Finska MosskFören. Årsb. 1939 : 43 : 44-93.

In Vesikivi's report on the work at the Leteensuu Experimental Station the following is of interest to plant breeders:—

Wheat

In spring wheat trials on bog land, the Finnish varieties, Sopu, Hopea, Ruskea and Pika II were compared with the Swedish wheat Diamant. Sopu, Hopea and Pika II gave grain yields of 21.8, 21.4 and 20.4 double centners per ha., with a thousand corn weight of 31.9, 30.9 and 26.4 grm. respectively, the corresponding figures for Diamant being 20.1, and 34.2. The relative figure for firmness of straw was 6 for all four Finnish wheats and 7 for Diamant. Sopu, Hopea, Ruskea and Pika II required 104, 106, 105 and 102 days for their growth period, Diamant 109. Sopu and Hopea are recommended for certain districts where Diamant fails to ripen.

In trials on clay soil, Sopu, Hopea and Ruskea did particularly well and surpassed the Swedish wheat Diamant II in yield of grain.

Carrot

Carrot trials were conducted on fenland with the varieties London Torg [London Market], Nantes, St Valery, Köpenhamns Torg [Copenhagen Market] and Amsterdam.

Lauri Saloheimo's report on work at the Karelia Experimental Station includes the following:—

Wheat

On bogland, Pika II, Sopu, Hopea and Ruskea ripened on 12, 14, 15 and 17 August respectively, giving yields of 25.1, 22.0, 22.0 and 25.6 double centners per ha.; the corresponding figures for Diamant were 20 August and 25.9 double centners per ha.

Red Clover

Work on clover was started in 1928. The 1938 trials included one strain, Tammisto, bred at the Hankkija Plant Breeding Station, and four other strains obtained from farmers in different localities. The Tammisto strain proved earlier than the others, but some of the land varieties gave higher yields.

Flax

These trials began in 1934. The 1938 tests included Kurländsk, Martta, Aino and Valio 0811, being mainly varieties bred by the Plant Cultivation Division of the State Agricultural Research Institute. Martta gave the highest yield of fibre.

Pea

The plants tested included a land variety of fodder pea, Torsdag II, Koivisto, Kaleva and Artturi. Of the culinary peas Koivisto gave the best yields, and of the fodder peas, Artturi.

1506. 575:633(48.5)

Akademiens sekreterare: Årsberättelse för 1946. (**Academy of Agriculture, Secretary's report for 1946**).

K. LantbrAkad. Tidskr. 1947 : 86 : 13-35.

During the year reviewed, Lindberg carried out important work at Svalöf on the detection of varietal differences in the baking quality of wheat, and on the bromate effect and the influence of malting upon baking quality. With Tedin, he also investigated starch and sugar content in potatoes and the relation between starch content and specific gravity, and evolved a new practical method of starch determination. With Åkerman, he studied the chemical aspect of winter hardiness of grain, the sugar content in beets and vitamin problems.

Government grants have been a stimulus to the research on many of the following subjects: amphidiploidy, which is being investigated by Turesson and by Levan; the production of a collection of forms with the double chromosome number for use in genetic operations with species regarded as specially suited for breeding by chromosome reduplication; cytological

studies of apples at Balsgård to obtain useful forms with the double chromosome number; lethal factor action in barley, and its relation to the heterosis hypothesis and the technique of breeding cross-pollinated plants; and the effect of a number of X-ray mutants in different genotype environments in barley.

Akerberg has been working on selection for eelworm resistance in red clovers, while Johansson is occupied with the ecology and biology of the pest.

The grants from the Swedish Research Council and the Agricultural Academy for research during 1946 totalled 325,120 kr. The Academy awarded grants for research on chromosome doubling and hybridization experiments with *Medicago*; seed raising and the floral biology of blue lucerne; winter hardiness of red clover and blue lucerne and the value of different red clover strains; and sweet lupin cultivation requirements and technique (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1582).

1507.

575:633(48.5)

Försöksverksamheten på jordbrukets område. (**Research activities in the sphere of agriculture**).

Lantmannen 1947 : 31 : 601-02.

Suggestions have been put forward to prevent overlapping in Swedish research in agriculture and its various branches. Special attention was given to defining the scope of the work of the Agricultural College (Lantbrukshögskolan) and of official research centres for horticulture, plant protection, and plant breeding such as Weibullsholm, Svalöf and Ultuna. Finance, equipment and staff were also considered by the investigating committee.

1508.

575:633(49.2)

Studiekring voor plantenveredeling. (**Study circle for plant breeding**).

Landbouw. Tijdschr. Wageningen 1944 : 56 : 211-14.

The formation of a study circle is reported for the investigation of the fundamental problems bearing on plant breeding, some of which may, however, ultimately provide a basis for the successful breeding of new varieties in agriculture, horticulture and forestry.

Members of the circle must expect no personal advantage from their contributions to the studies, though it is hoped that the practical breeder will eventually derive benefit from the results. Members must also be acquainted with scientific argument, general terminology and concepts of plant breeding in the wider sense.

The initial discussion on the procedure of meetings and the work of the circle is recorded here in abbreviated form.

1509.

575:633(49.5)

Report of the FAO Mission for Greece. Food and Agricultural Organization of the United Nations, Washington D.C. March 1947:
Pp. 188.

The importance of introducing improved agricultural and horticultural crop varieties is stressed in Recommendations 30 and 51 of this FAO report. The work of the Plant Breeding Institute at Thessalonica and the Forage Crop Research Station at Larissa has already resulted in the fairly widespread introduction of improved varieties of wheat and leguminous forage species. The Mission further recommends, in view of the shortage of animal feeds, the sowing of adapted leguminous crops in alternate years in dry farming regions instead of fallowing the land between grain crops, and also the cultivation of such crops instead of cereals in olive groves and fruit orchards.

Attention is also drawn to the urgent need for the distribution of approved fruit tree varieties, and the standardized production of varieties suitable for the preserving and canning industry.

1510.

575:633(72.95)

Fourth annual report of the Director of the Institute of Tropical Agriculture, University of Puerto Rico. Fiscal year 1945-1946
(1946) : Pp. 38.

Forage grasses

Chromosome counts have been made on the root tips of the following tropical and sub-tropical species. *Andropogon annulatus* Forsk, $2n = 40$; *Cymbopogon citratus* (D.C.) Stapf.,

from Java and the West Indies, $2n = 60$; *C. nardus* (L.) Rendle, from Java and Guatemala, $2n = 20$; *Digitaria sanguinalis* Scop., $2n = 36$; *Panicum maximum* Jacq., vars Gramalote and Guinea, $2n = 32$; *Panicum laxum* Sw., $2n = 40$; *Paspalum notatum* Flügge, from Venezuela and var. *Nativa*, $2n = 40$; *Paspalum Urvillei* Steud., $2n = 40$; *Pennisetum purpureum* Schum., vars Dwarf, Florida, *Merkeri* and *Elefante*, $2n = 28$; *Sporobolus indicus* (L.) R. Br., $2n = 24$; and *Stenotaphrum secundatum* (Walt.) Kuntze, vars *Enana* and *Elefante*, $2n = 18$.

Sugar cane

Experiments were carried out on embryo culture *in vitro*, using open pollinated P.O.J. 2878, a highly fertile *Saccharum spontaneum* hybrid, and three highly sterile crosses, Co.201 x P.R.900, Uba x P.R.900 and M-28 x M-317. One embryo was found in a large number of dissections of florets from the three sterile crosses, suggesting that infertility in these crosses is not due to incompatibility between embryo and maternal tissue, but rather to some failure at or before the time of fertilization. In the experiments on the fertile material, embryos as small as 66 microns in length at the time of dissection grew into normal seedlings on the standard medium plus coconut milk.

Coffee

Experiments on the "hardening" of seedlings to high temperature and sun exposure by means of previous seed treatments are reported.

Papaya

Introduced material is being tested for bunchy top resistance.

Pineapple

Varieties and strains of wild and cultivated pineapples have been introduced for agronomic and genetical study.

Onions

In work to develop improved varieties, hybrid material obtained from the United States Department of Agriculture is under test, and an attempt is also being made to induce flowering by cold treatment before transplantation.

Tomato

The following material is under observation: disease resistant experimental hybrids from the United States Department of Agriculture; standard varieties such as Marglobe and Pritchard; *Lycopersicon pimpinellifolium* and *L. hirsutum*; and native tomato strains. One strain of native tomato has given an average yield of 6½ lbs of rough but solid fruit, a considerably higher yield than any of the yields given by the other native strains; this strain also shows exceptional vegetative vigour. A U.S.D.A. hybrid, T 1601, is a very prolific fruit setter. Another U.S.D.A. selection, WST 95-4, which includes *L. pimpinellifolium*, Marglobe, Montgomery and Determinate Shipper in its parentage, gave the highest yield among the introduced varieties.

A large number of crosses have been made as a first step in the work of combining several desirable characters.

1511.

575:633(73)

Office of the Agricultural Attaché. British Embassy, Washington 8, D.C. February, 1947-April, 1947: Tech. Digest No. 4: Pp. 26 (Mimeographed).

Reference is made to the following investigations in the United States:—

Wheat

Hessian fly resistant varieties are now being released for commercial multiplication.

Oats

The recent outbreak of *Helminthosporium Victoriae*, particularly in the Mid-West, has emphasized the need for breeding varieties with resistance to this disease. Strength of straw is also receiving attention; the Overland variety has been developed for use on highly fertile soils, especially in irrigated areas.

Maize

The chemical composition and nutritive value of the grain are receiving increasing attention at the Iowa Experiment Station.

In general, hybrid maize has at least a 1% lower protein content than the older open-pollinated varieties. The suggestion has been made by Hayes that this may be because there are fewer nubbins or blind grains on the cobs, and that in selecting for yield, stress has unconsciously been laid upon carbohydrate content.

Varieties have now been bred with 10%–12% oil content. As these varieties have a higher ratio of germ to endosperm, they also tend to have a better quality protein; the proportion of zein is reduced and that of proteins containing the amino-acids tryptophane and lysine is increased. These developments are of considerable importance in relation to the livestock industry and human nutrition.

Barley

Several varieties have exhibited resistance to Hessian fly in greenhouse tests.

Potato

The recently released Teton variety has shown a high degree of resistance to ring rot (cf. Abst. 749). Three scab resistant varieties have also been introduced (cf. Abst. 748). Blight immune varieties have been named but require further trial.

Sugar beet

Use is being made of male sterility to produce disease resistant, high-yielding hybrids.

Vegetables

Work at the Regional Vegetable Breeding Research Laboratory at Charleston is concentrated upon the development of vegetables with a high nutritive value.

1512.

575:633(74.1)

Report of progress of the Maine Agricultural Experiment Station, Orono, for year ending June 30, 1944 : Bull. No. 426 : Pp. 409.

Maize

New hybrids and varieties introduced from other states have been studied; two new flint-dent double crosses from Wisconsin are now available under the names of Maine A and Maine B.

Potato

In breeding for resistance to bacterial ring rot, crosses involving the resistant President variety, seedlings derived from President, S.46952 and Friso have produced various percentages of resistant progeny.

The development of leaf roll resistant seedlings is in progress.

Green Mountain was selected for resistance to leaf roll and net necrosis. Selected tuber lines showed no differences in susceptibility to either leaf roll or net necrosis.

Tests have confirmed the general observation that the newer varieties, such as Katahdin and Sebago, do not develop net necrosis to any appreciable extent, although susceptible to leaf roll.

Wild species and commercial varieties showed a wide range of differences in reaction to aphid attack (*Myzus persicae*) on the basis of counts of aphid populations resulting from the artificial infestation of caged potato plants. On the basis of this determination of resistance, *Solanum polyadenium* proved to be highly resistant; this species is now being used in breeding. Genetic variation in the injury caused by aphids was also investigated. The varieties and species studied fall into four fairly distinct classes. One group, represented by *S. polyadenium*, could be classed as immune to aphid damage. Another group, including Houma, Burbank and Parnassia, was classed as resistant. A third group, including Sequoia, Netted Gem, Golden President and several other commercial varieties, showed some injury and supported larger aphid populations than the resistant group. A further group, classed as susceptible, included Katahdin, Mohawk, Sebago and other commercial varieties, and *Solanum Caldasii* var. *glabrosum*; it showed severe aphid damage in a relatively short time.

Experiments on stem-end browning in Green Mountain have shown that all tuber lines may be grouped into two general classes, viz. those fairly resistant to stem-end browning and those that are highly susceptible.

A study was made of the vitamin C content of six varieties during storage.

Rutabaga

Varieties were analysed for vitamin C content; and the losses of vitamin C in cooking were determined in the Macomber and Long Island varieties.

Apple

Breeding is being carried out.

The production of hardy stocks is receiving attention.

Strawberry

Marked varietal differences in vitamin C content are reported.

Promising hybrid selections have been obtained.

Kale

Varietal differences in vitamin C content were noted. Blue Scotch was significantly higher in vitamin C content than any of the other varieties tested; its average content was 189 mg. per 100 grm. Losses of vitamin C as a result of cooking were also investigated in five varieties.

Cucumber

The Maine No. 2 variety developed some years ago is resistant to scab (*Cladosporium cucumerianum*); its fruits are, however, not long enough for the market grower. An attempt is being made to develop improved scab resistant pickle and slicing types.

Tomato

Varietal analysis of vitamin C content was continued. Varietal differences in vitamin C retention of canned tomatoes were also studied.

Out of 43 F_1 intervarietal hybrids studied, 41 gave yields equal to or surpassing the mean parental yields.

Phaseolus

Hybrid selections derived from the Hercules, Conserva and Brittle Wax varieties of snap bean show promise as canning types.

Bean breeding for resistance to anthracnose and halo blight is reported. Blight resistant rogues of Dark Red Kidney have been crossed with more desirable types; selection is in progress.

Sweet corn

A programme of hybrid production for the canning industry is being carried out. Some promising new inbreds have been produced from a series of back-crosses with Purdue 1339. A new garden sweet corn hybrid, obtained from a cross between a local Golden Bantam strain and Connecticut C4, was distributed under the name of Northland. The hybrid is very early maturing, and yields small to medium sized ears with eight to ten rows of good quality kernels.

1513.

575:633(74.1)

**Report of progress of the Maine Agricultural Experiment Station,
Orono, for year ending June 30, 1945 : Bull. No. 438 : Pp. 698.**

Potato

Tests for ring rot resistance were continued; President, and Seedlings 47102, 46952, 870 and 824 exhibited resistance. When used in crosses, President and Seedling 336-144 (President x Katahdin) give progenies possessing a high percentage of ring rot resistant plants, but also high percentage of very late seedlings with badly shaped tubers. Seedlings 46952 and 74102, however, produce resistant hybrid progenies with commercial qualities.

Attempts to produce leaf roll resistant seedlings continue.

The results of grafting experiments on Green Mountain suggest that a virus is concerned in susceptibility to stem-end browning. Tuber lines of any given strain of Green Mountain showed the same behaviour with regard to stem-end browning, i.e. either susceptibility, or a fair degree of resistance. Selection for resistance did not result in improved resistance.

Investigation of the vitamin C content of stored varieties was continued.

Rutabaga

The Macomber and Long Island varieties were analysed for vitamin C content. The effect of cooking upon vitamin C content was studied in the Long Island and Bangholm varieties.

Apple

Breeding work continues; about 1500 trees derived from controlled crosses are under observation.

Strawberry

Promising red core resistant selections developed from crosses between the susceptible Howard 17 variety and the resistant Aberdeen strawberry and other varieties are under observation.

Cucumber

A new slicing type resistant to scab (*Cladosporium cucumerinum*) has been distributed for growers' trials.

Tomato

The results of vitamin C analysis of six varieties during the period 1938-44 are summarized. Best of All possessed the highest average content, 30.9 mg. per 100 gm. Analysis of the vitamin C content of canned varieties was continued. Of the four varieties which had the highest raw values for vitamin C, the following also had the highest values for the canned product; Best of All, Early Trellis and Comet.

F₁ hybrid tomatoes continue to show a general superiority over their parents in yield and earliness. The F₁ hybrid Danmark x Pritchard was included in a varietal trial.

Phaseolus

Bean breeding for resistance to halo blight and anthracnose continues.

Maine No. 400, a round-podded, white-seeded snap bean selection from the cross Hercules x Conserva was notable for its straightness and length of pod; it was also several days earlier in maturity than Full Measure or Tendergreen.

Sweet corn

Promising new hybrids suitable for canning have been developed.

1514.

575:633(74.2)

Agricultural research in New Hampshire.

Rep. Dir. N.H. Agric. Exp. Sta. 1945 : Bull. No. 363 : Pp. 61.

Cereals

Varietal tests of spring wheat, oats, barley and maize are reported.

Forage crops

Breeding and selection work on Ladino clover (*Trifolium repens*), red clover and *Phleum pratense* is in progress.

Nuts

Selection of the butter nut and native hickory nut is mentioned.

Rubus

Hybrids between the blackberry and *Rubus odoratus* blossomed in 1944; they are thornless plants with pink flowers, and are almost sterile. Root cuttings were treated with colchicine; several apparently tetraploid plants produced by this treatment are under observation.

Strawberry

Hybrids involving Fairfax as a parent have produced in most cases dark red, firm fruit with a good flavour. A selection of a cross between Tupper and Fairfax yielded very firm fruit of high quality, but was relatively low in productivity. Crosses between Pathfinder and Catskill resulted in high-yielding plants with large fruit; the fruit were, however, soft and otherwise unsatisfactory in quality. Hybrids involving Simcoe as one parent yielded firm fruit. Promising hybrid selections are to be used in further breeding work.

Selections of hybrids between certain cultivated varieties and the native wild species *Fragaria virginiana* have shown high yields, and resistance to drought and winter injury. The flavour of some of these selections is satisfactory.

Tomato

Tests of varieties and selections for resistance to *Phytophthora infestans* were continued; none of the material has so far exhibited immunity.

Musk-melon

An unnamed variety possessing good quality and perfect flowers is under trial; the fruits are round and green, with deep orange coloured flesh. If introduced, the variety will be useful only as a domestic variety where extreme earliness is desired. This variety is being used in further breeding, which aims at combining an improved fruit type with perfect flowers.

1515.

575:633(74.4)

Annual Report of the Massachusetts Agricultural Experiment Station for the fiscal year ending June 30, 1946 : Bull. No. 436 : Pp. 70.

Maize

Hybrid production is reported. The double cross (CC4 x CC8) x (Q83 x A96) shows particular promise as an early maturing field maize.

Potato

In co-operative tests with the United States Department of Agriculture, new lines have shown a high degree of scab resistance. A few lines have exhibited considerable resistance to *Rhizoctonia*.

Tobacco

An attempt is being made to produce Havana seed strains which will yield tobacco of acceptable type and quality under different conditions of growing, particularly in connexion with the occurrence of black root rot.

In commercial tests of the suitability of new strains for general use in the Connecticut Valley, Havana K 1 and Havana K 2 have given better results than Havana 211 and other previously produced strains.

Capsicum

Breeding is being carried out to develop an early, high yielding and thick fleshed pepper of the Californian Wonder type.

Onion

Hybrids between male-sterile lines of Early Yellow Globe and Ebenezer are under investigation.

Asparagus

Breeding and selection are reported.

Broccoli

Improved uniformity in time of maturity and plant type in commercial varieties are breeding objectives. Selfed lines with the desired uniformity in both characters have been secured, but they show reduction in vigour and adaptability. Cross-pollination was allowed in the selfed strain R-45, and vigour was improved, with a maintenance of uniformity. This strain has given better results under experimental trials than any other broccoli tested; it has produced 89% of centre heads by June 15; it is to be further tested in 1946 for its seasonal adaptability before commercial distribution.

Cucurbits

Further tests of the susceptibility of the cultivated cucurbits have indicated that varieties of *C. moschata* are immune to attack by the squash vine borer; in 1945 no infestation was observed in the Cushaw, Longfellow Pumpkin, Alagold, Large Cheese Pumpkin, Tennessee Sweet Potato and Butternut varieties of *C. moschata*. Cucumbers, cantaloupes, and water-melons also exhibited immunity. Four varieties of *C. maxima* showed an average infestation of 5.45 borers per vine, while in six varieties of *C. Pepo* an average infestation of 3.47 borers per vine was observed. Selfed lines of Butternut squash have been selected with the aim of reducing the percentage of cracked, mis-shapen and too large fruit.

According to an analysis of the carotene content in the Butternut squash, dark coloured flesh does not necessarily indicate high carotene content.

Tomato

The following tomatoes were released as resistant to leaf mould (*Cladosporium fulvum* Cke): Improved Bay State, Improved Vetomold-121, Leafmold Resistant, Marglobe, and Leaf

Mold Resistant Waltham Forcing. An introduction of *Lycopersicon pimpinellifolium* from Ecuador (P.I. 112,215) provided the source of resistance to the fungus. Four similar varieties with resistance derived from P.I. 129,882 from Peru, are, however, now completely susceptible to leaf mould. The Globelle, Vetomold, Vetomold 121 and Bay State varieties previously developed as resistant, have now also lost their resistance. It appears therefore that varieties released as resistant possess only a limited period of utility, on account of an increase in the virulence of the fungus when cultured on successive generations of resistant hosts.

A cross of Prince Borghese (*L. esculentum*) with *L. peruvianum* outcrossed to Pan America, and the same cross back-crossed to Prince Borghese are being studied for their reaction to leaf mould. *L. peruvianum* is highly resistant to this disease. *L. peruvianum* and selections from the above crosses are also under investigation for their reaction to the root-knot nematode.

Sweet corn

The development of inbred lines for hybrid production is reported. Inbred Mass. 32 has proved to be a promising seed parent in hybrid combination particularly when crossed with Conn. 42; the hybrid Mass. 22 x Conn. 42 is an early Golden Cross Bantam sweet corn.

1516.

575:633(74.7)

59th Annual Report of the New York State College of Agriculture at Cornell University, Ithaca, New York, and of the Cornell University Agricultural Experiment Station 1946 : Pp. 183.

Wheat

Breeding work aims at developing varieties superior to Yorkwin and Cornell 595 in respect of quality, yield, winter hardiness and stiffness of straw. A high-yielding variety with softer flour than either of these varieties would be more suitable for the purposes of pastry manufacture. A variety with better straw qualities than Nured is desired for livestock feeding. Smut and rust resistance are also included in the breeding programme.

Buckwheat

Genetical analysis of certain characters, including seed colour, seed shape and type of style, is in progress. Sterility is also being investigated.

Oats

The inheritance of a number of characters is being analysed in two forms of *Avena sterilis* var. *macrocarpa*. The inheritance of smut resistance is also receiving attention. Breeding for leaf rust resistance is reported. Promising strains with both leaf rust and smut resistance have been bred.

Maize

Cytological studies of commercial inbred lines have shown that certain lines are much more suitable for the study of chromosome characteristics than others, and that the differences in suitability are inherited. In the more favourable lines for cytological examination the individual chromosomes may be readily identified in the pachytene stage.

Investigations on the inheritance of white cob and red pericarp were continued.

It has been found that the 8 kernel row number is almost completely dominant to 12 kernel rows. No cases were found in which the 12-row number was dominant to the 8-row kernel number.

Standard inbred lines have been crossed with maize from Cuzco, Peru, in order to study the inheritance of aphid resistance.

Breeding hybrids for silage and grain is reported.

Barley

Genetical studies on the type of spike, the hooded condition, and straw strength were continued in winter barley.

In winter barley breeding, improved hardiness, stiffness of straw, and resistance to smut and mildew are receiving attention. The Wong variety is being used in crosses to develop increased hardiness.

Stronger straw and mildew resistance are the main objectives in spring barley breeding work. Many new mildew resistant strains have been secured.

Forage grasses

The method of growing selected clones of brome grass in controlled heat chambers has proved to be useful as a means of testing the capacity to yield a good aftermath crop at high temperature (cf. Abst. 232). Varieties of brome grass, timothy and other species are under trial.

Forage legumes

Cytological investigations are to be carried out on the variability of narrow-leaved, broad-leaved and intermediate types of birdsfoot trefoil.

Selfed and crossed progenies of lucerne are to be studied.

Red clover breeding is in progress.

Zigzag clover (*Trifolium medium* L.) has shown ability to spread in the course of three years from a single cutting to a uniform stand. Seed production, however, is very low, and vegetative propagation must be used if this kind of clover is to be grown commercially.

Potato

Seedlings showing promising improvements in yield, earliness and other characters have been secured. A few strains produced from crosses between *Solanum chacoense* and *S. tuberosum* and subsequent back-crosses to *S. tuberosum* yield fairly good tubers and show insect resistance; probably several more back-crosses will be necessary before satisfactory tubers are produced.

Cabbage

Breeding for yellows resistance in the Danish type has been carried out. The Danish type 399-4-8, which has given good results on the muck soils of Florida, will be released co-operatively by the Cornell and Florida Experiment Station under the name of Florida Danish, if it continues to give satisfactory results.

Musk-melon

The F_1 hybrid of the cross 13 x Honey Rock possesses *Fusarium* wilt resistance, early maturity and good quality; its fruit is, however, rather small. It is hoped that the cost of seed production of this hybrid may be reduced by the use of a monoecious strain of 13, obtained by crossing Banana and 13 and back-crossing four times to 13. Evidence has been obtained suggesting that large fruit size and the monoecious character are associated.

Cucumber

Breeding work aims at developing mosaic resistant pickling, slicing and dill types.

Phaseolus

Breeding for mosaic resistance was continued. It has been found that mosaic resistance is retained through several back-crosses if resistant plants are selected in the F_2 generation following each back-cross.

Breeding for halo blight resistance is also being carried out. Strains similar to Tendergreen and White Kidney but possessing halo blight resistance are under test.

Soya bean

Investigations have included (1) the testing of grain-producing varieties of the central Corn Belt region for use in New York State as forage; (2) the development of early maturing, adapted grain varieties; (3) the production of improved early maturing varieties for use as green vegetable; and (4) the testing of early maturing varieties developed outside the state. After 1946, however, soya bean breeding is to be mainly discontinued on a large scale.

1517.

575:633(74.7)

Sixty-fifth annual report of the New York State Agricultural Experiment Station, Geneva, New York, 1946 : Pp. 73.

Hops

A large number of seedlings and named varieties were tested for resistance to downy mildew and aphid injury. Brewers Gold has proved to be the source of the most seedlings in respect of resistance to downy mildew and aphid, yield, quality of the cone and other characters.

Fruit Trees

A total of 6005 apple seedlings from crosses between diploid parents have yielded 19 triploids with a chromosome number of $2n = 51$. A total of 628 seedlings produced from

triploid seedlings, mostly by open pollination, has given 12 tetraploids. The tetraploid seedlings thus developed can be crossed with diploid varieties to produce large numbers of triploids. It is hoped that this method of breeding will be valuable in the development of improved late-keeping varieties. Cytological investigations have shown that a large fruited form of the Northern Spy apple is a periclinal chimaera. The outer cell layers have the diploid chromosome number, while the cells in the central portion are tetraploid; the sport breeds as a diploid. The Cortland apple, developed by the station, is giving good commercial performance. In ascorbic acid tests on apple varieties and seedlings, Calville Blanc again possessed the highest content, with 37 mgm. per 100 grm. Other varieties high in ascorbic acid content were Sturmer Pippin, Bramtot, Esopus, and Opalescent. In pear breeding investigations, Bartlett pollinated with Farmingdale, Old Home and Seckel Seedling No. 827 set abundant seed. Seed obtained by open pollination of pear varieties exhibiting some degree of blight resistance has been secured in the attempt to develop blight resistant pears.

Peach varieties were crossed to breed superior commercial peaches with improved freezing qualities. Low seed germination has been found to be correlated with early ripening in the peach; plum varieties are under investigation to determine whether this correlation is also to be observed in the plum. Peach varieties and seedlings were analysed for ascorbic acid and carotene content. Michel No. 1 ranked high in content of both vitamins.

Small Fruits

Crosses were made between strawberry varieties and seedlings to develop varieties with resistance to leaf spot and root rot, and superior qualities of the fresh and frozen fruit.

In an analysis of 308 strawberry varieties and seedlings for ascorbic acid content, Catskill gave the highest value of 81 mgm. per 100 grm. Red raspberry hybridization has been carried out with the aim of producing superior commercial varieties for use as fresh and frozen fruit, which are also resistant to diseases, particularly to viruses.

Grapes

Breeding to improve table and juice qualities is in progress.

Musk-melon

Breeding for mosaic tolerance and good fruit quality is in progress.

Squash

Breeding is reported.

Tomato

The production of earlier ripening varieties for the canning industries is receiving attention. The new early ripening variety Geneva No. 2 has been introduced for trial with several canning companies.

Pea

The variety Creole, reputed to be tolerant to heat, has been crossed and back-crossed twice to Pride, a commercial canning variety. Some of the plants produced appeared to be higher yielding than Pride under warm conditions. Further testing of these selections and further breeding are to be carried out.

1518.

575:633(75.6)

Research and farming.

68th Rep. N.C. Agric. Exp. Sta. 1945 : 4 : Progr. Rep. No. 4 : Pp. 108.

Wheat

Strain 3 of the cross Malakoff x Nittany is to be released for the western districts of North Carolina; Nittany is a standard strain of Fulcaster. This selection is rust resistant and has outyielded several varieties. Promising selections of Hardired and the cross Frondoso x (Redhart x Noll) are under study; they are stiff-strawed beardless wheats possessing good rust resistance and high yielding capacity.

Oats

The new Lemont variety is recommended for the Piedmont area. It has been produced from the cross Lee x Winter Fulghum, and it has outyielded Lee, Fulwin and other varieties. It is, however, susceptible to rust, and on soils of high fertility it tends to lodge.

Maize

Hybrid production is reported.

Barley

Selections of crosses between Bolivia or Chevron and locally adapted varieties such as Sunrise, Iredell and Davidson showed promising resistance to leaf rust, and outyielded Sunrise. Selections of the crosses Davidson x Sunrise and Hooded 26 x Sunrise proved resistant to both mildew and brown loose smut.

Tobacco

In a comparative test of blackshank resistance, Oxford 1, 2 and 3 showed an average of 29.0, 5.9 and 7.9% diseased plants, respectively; their resistant parent, Florida 301, averaged 9.6%. According to the farmers' reports, Oxford 1, however, appeared to be superior in quality.

Peanut

The propagation of peanuts by cuttings has proved valuable in hybridization work.

Rubus

The promising dewberry selections, W-45, 38-7-3 and 39-11-13, yielded almost twice as much fruit as the Lucretia variety; their berries were also larger.

New red raspberry selections are under test. In the year under review four of these gave considerably higher yields than the standard variety Latham; selection 40-7-6 is particularly promising on account of its disease resistance and fine quality; its yield was double that of Latham. The seedlings which fruited in 1945 included some derived from crosses involving three or four different raspberry species. These seedlings were the most vigorous so far obtained; they also yielded the largest fruit so far observed in the breeding programme.

Soya bean

The new variety Roanoke has been developed. It has given higher yields and has a higher oil content than Ogden and other varieties; it also possesses a high degree of resistance to shattering.

1519. GEORGE, L. V.

575:633(76.3)

New crops while you wait.

Sth. Seedsman 1947 : 10 : No. 6 : 15, 54, 58.

The following varieties bred at the Louisiana Experiment Station in recent years under the direction of J. C. Miller are briefly described: La Salle and De Soto potatoes; Unit 1 Porto Rico, Queen Mary and Pelican Processor sweet potatoes; Klonmore, Konvoy and Marion Bell strawberries; Louisiana Copenhagen and Louisiana Allyear cabbages; Louisiana Sweet collard; Louisiana Pearl shallot and C-5 Creole onion; Louisiana Dixie tomato; Louisiana Danvers carrot; and the Longfellow pumpkin and Louisiana Sugar Bowl squash.

1520.

575:633(76.4)

Panorama of agricultural research.

58th Rep. Tex. Agric. Exp. Sta. 1945 : Pp. 76.

Oats

An unnamed selection of the cross Fulwin x Lee-Victoria shows promise as a high-yielding hardy and leaf rust resistant variety.

Barley

Some Chinese barleys exhibited resistance to greenbug in the severe infestation of the 1942 crop. Crosses have now been made between these varieties and adapted barleys in the hope of developing resistant forms for Texas.

Sorghum

The breeding of grain sorghums resistant to foliage diseases is in progress.

Rescue grass (*Bromus catharticus*)

Selection for both high forage and high seed production has resulted in a strain giving 1169 pounds of seed and 2165 pounds of air-dry forage per acre.

Cotton

Work on breeding varieties suitable for mechanical picking is reported.

Cantaloupe

New strains are being developed ; a selection derived from a cross between Improved Smith's Perfect and a downy mildew resistant Indian variety gives high yields of commercially valuable fruit, and possesses good resistance to downy mildew.

Tomato

Tomatoes are being bred for resistance to *Fusarium* wilt and nematode root knot; use is being made of small-fruited South American tomato species.

1521.

575:633(76.7)

The experiment station reports.

57th Rep. Ark. Agric. Exp. Sta. 1946 : Bull. No. 464 : Pp. 23.

Cotton

The new varieties, Arkot 1 and Arkot 2, selected from Rowden and Stoneville 2B, respectively, were released. Arkot 1 has outstanding fibre quality; in tests during the past three years it has proved highly resistant to *Fusarium* wilt. Arkot 2 is similar to Stoneville 2B in plant characters, but somewhat more resistant to wilt.

Water-melon

Fusarium wilt resistant strains are being developed. The production of a freezing type is also receiving attention.

Tomato

Selections of a cross between the *Fusarium* wilt resistant Pan-America variety and Rutgers are under test. They are wilt resistant, superior to Rutgers in total yield, and five to seven days earlier in ripening; their fruits are also less prone to cracking.

1522.

575:633(77.2)

Fifty-eighth Annual Report of the Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1945 : Pp. 102.

Wheat

The breeding of early maturing soft winter wheats is receiving attention. The early maturing and disease susceptible Goens variety has been extensively used in hybridization. New early maturing strains are now available for testing, which are also highly resistant to mosaic and loose smut.

Breeding for resistance to rosette mosaic is reported. In the crosses studied, resistance to the disease was conditioned by a single dominant gene.

Maize

Hybrid production is in progress.

The possible genetical variation in the lysine content of the grain is to be investigated. A technique has been developed for the determination of small amounts of lysine, based upon colorimetric procedure and chromatographic adsorption.

In breeding for resistance to *Helminthosporium turcicum*, the Oh. O4, O3, O2, and M.21A inbreds have shown a high degree of resistance.

Investigations on the linkage relationships of the gene *hm* conditioning susceptibility to *H. carbonum* have indicated that this gene is approximately 18 cross-over units to the left of the gene *br* for the brachytic character on chromosome 1. Further study of the location of *hm* is in progress.

No evidence of physiological races of ear rot (*Diplodia Zeae*) was obtained. The relation of maturity to ear rot susceptibility was studied; the single crosses inoculated seven to ten days after full silk development showed a higher incidence and greater severity of the disease than comparable single crosses inoculated about a month later.

Barley

Crosses have been made between unadapted loose smut resistant winter barleys and adapted susceptible varieties, to breed loose smut resistant winter barleys suitable for Indiana. Crosses have also been carried out to develop winter barleys resistant to mildew and leaf rust; some of the resistant lines obtained possess a much stiffer straw than the standard varieties.

Forage plants

Breeding work on timothy, blue grass (*Poa*), red top (*Agrostis alba*), and birdsfoot trefoil was begun in 1944. Red clover and lucerne are also to be included in this breeding programme in the near future.

A new strain of little red clover is being increased for commercial distribution. It is a multiple strain derived from three strains of the Ohio clover. The new strain gives good yields of both seed and hay; it possesses a high degree of anthracnose resistance.

Forest trees

The study of pollen dispersal is being carried out to obtain information on the mode of race formation in forest trees. The results obtained in 1944 show that for the American elm, white ash and Douglas fir, genetic variation may be possible in linearly continuous populations, according to the determinations of pollen dispersal. In cottonwood and hackberry, however, pollen dispersal was found to be too great to make genetic differentiation possible without geographical isolation.

Rhubarb

The results of a comparative test of the German Wine and Ristow varieties suggest that the former variety possesses some degree of resistance to crown or foot rot. The species *Rheum Ribes*, obtained from Iran, is under observation.

Cucurbits

Musk-melon varieties and strains, three strains of *Cucumis dipsaceus*, three strains of the West Indian gherkin (*C. Anguria*), and the lemon cucumber (*C. sativus*) were tested for resistance to bacterial wilt. Inbred lines of the Hales Best type of musk-melon showed the most promising resistance.

Crosses between commercial musk-melon varieties and the Conomon variety were secured; the latter variety is highly resistant to mosaic diseases. The crosses were effected by a plant and fruit pruning method combined with the application of indole butyric acid in lanolin to the ovaries, instead of the technique of artificial embryo culture generally used in making this cross.

Selfed lines of musk-melon have been obtained exhibiting aphid resistance.

Some F_1 hybrids from crosses between Hawkesbury and inbred *Fusarium* wilt resistant strains were superior to Hawkesbury in yield, fruit shape and colour of the rind.

Tomato

Lycopersicon hirsutum is being used in breeding for resistance to *Septoria Lycopersici*.

Lines highly resistant to *Fusarium* wilt and showing promise as possible canning tomatoes have been derived from crosses of a Red Currant selection (*L. pimpinellifolium*) with Rutgers and Indiana Baltimore. All the lines have satisfactory fruit size and quality; they are to be further tested.

An analysis of the carotenes found in *Lycopersicon* species and interspecific crosses is reported; approximately 35 to 40 carotenes have been isolated. Breeding for increased β -carotene and vitamin C content is in progress. Strains have been produced which approach the carrot in their β -carotene content. Strains of the currant tomato are being used in breeding for high vitamin C content.

Breeding and selection to improve several characters affecting yield and quality are also reported.

Phaseolus aureus

A new mung bean variety is to be commercially distributed under the name Hoosier (C.I. 70043). It is an upright type, and it produces a good yield of high quality seed.

Soya bean

A new character of apparent mosaic infection, which probably arose as a mutation, was observed in an F_2 plant. The character is a simple recessive to the normal, and is to be known as the pseudo-mosaic type; the genetic symbol has been designated *pm*. Seed production is much reduced in this recessive.

The linkage relationships between several plant characters are under investigation.

Hybrid strains have been developed which exhibit improvements in yield, resistance to lodging and chemical composition. A strain superior to Richland in yield and oil content

is well adapted for central Indiana; the strain is equal to Richland in resistance to lodging and as early in maturity. The production of high-yielding, early maturing varieties for use in rotations in which wheat is sown after the soya bean crop is receiving particular attention.

Sweet corn

Hybrid production is reported. New Country Gentleman double cross hybrids have yielded 10 to 25% more than open-pollinated varieties and commercial hybrids.

Popcorn

Since popcorn producers have planted large acreages of F_2 seed during recent years, experiments were carried out to compare the performance of F_1 and F_2 seed. The results indicated that the use of F_2 seed is not profitable, especially as F_1 hybrids are available.

Mentha

A fertile polyploid of the common black peppermint (*M. piperita*) has been crossed with spearmint (*M. crispa* and *M. spicata*) and with Japanese mint (*M. arvensis* var. *piperascens*). F_1 plants were tested in the greenhouse for resistance to anthracnose and rust. Resistant selections were planted in the field, where clones were selected for further testing on muck soils; selected clones are under test for resistance to *Verticillium* wilt and for the quality of their oil.

1523.

575:633(79.1)

Fifty-sixth Annual Report of the University of Arizona Agricultural Experiment Station, for the year ending June 30, 1945:
Pp. 81.

Wheat

An attempt is being made to combine the rust resistance of *Triticum Timopheevi* with that of Baart 38; the latter variety has the Hope type of resistance. Three back-crosses of *T. Timopheevi* x Baart 38 to Baart 38 have been studied.

Lucerne

The new selection Chilean 63-1, produced from Chilean 21-5 in 1938, has given the best performance in tests during the last two years; Hairy Peruvian was the second and African the third best variety in these tests.

Sweet potato

Varietal differences in carotene content proved to be consistently greater than the differences in ascorbic acid values.

Cotton

Selection of the Upland cottons, Acala and Stoneville 2B, is reported. Selection for several characters was carried out in the following hybrids and back-crosses: Santan (Shafter type Acala) x 1517 (New Mexican Acala); Santan x Stoneville 2B; Santan x Wilds No. 13; Santan x (Santan x 1517); 1517 x (Santan x 1517); Santan x (Santan x Wilds No. 13); and Wilds No. 13 x (Santan x Wilds No. 13).

In breeding long staple cotton, F_5 selfed families of the second back-cross of Tangüis x Pima to Pima were studied with regard to fibre length, fineness and strength, seed weight per 100 grms, lint percentage and lint index.

Tangerine

The fruit of the Algerian variety was found to have an average ascorbic acid content of 54 mg. per 100 gm., while those of the Dancy variety had 34 mg. On the other hand, the Dancy variety had a higher carotene content than the Algerian; edible segments of Dancy and Algerian contained on the average 0.295 and 0.12 mg. of carotene per 100 gm. respectively.

Date

Varieties of Arizona dates were analysed for their carotene, thiamin, riboflavin and ascorbic acid contents.

Lettuce

A new variety developed by single head selection and inbreeding in U.S.D.A. strain No. 41068 has been released under the name Imperial No. 410. This variety is a very vigorous,

thick-leaved type; it produces larger heads than Imperial 615. It is resistant to tip burn and slime. The variety is only recommended as a spring crop for the Salt River Valley region.

The breeding of strains more resistant to bolting under conditions of high temperature continues.

Melon

An improved variety for the domestic gardener and local market grower is being developed from a cross between the Jap melon and the Imperial 45 cantaloupe. Hybrids between Hearts of Gold and Imperial 45 are under selection with the purpose of producing a melon with good quality, suitable for transport. An improved mildew resistant melon has been derived from the cross between a U.S.D.A. mildew resistant melon and Arizona 13.

1524.

575:633:007(47)

Stalin Prize awards for 1946.

Soviet News 1947 : No. 1727 : p. 1.

KAFTANOV, S.

Laureates of science.

Ibid. 1947 : No. 1728 : p. 4.

ZHIGACH, K.

Achievements of Soviet technique.

Ibid. 1947 : No. 1734 : p. 1.

It is reported that Rudnickii has been awarded a Stalin prize for his production of new winter rye and winter wheat varieties. The frost resistant Viatka variety of wheat bred by Rudnickii is now being extensively sown. A prize has also been awarded to Jurjev for developing new high yielding spring and winter wheats, and to Černenko for developing hardy fruit varieties. Approximately 16,000 cuttings of Černenko's new apple varieties have been distributed to state farmers and agricultural research stations for further trial. Musilko has received a Stalin prize for his method of artificial pollination of several field crops.

1525.

575:633:007(48.5)

Harry Weibull.

K. LantbrAkad. Tidskr. 1947 : 86 : p. 36.

The death of Director Harry Weibull of Landskrona is announced, and his well known work in the promotion of plant breeding is recalled.

1526.

DOMINGO, W. R. and

SCHUFFELEN, A. C.

575:633:575.3:631.41

Landbouwscheikundig onderzoek en plantenveredeling. (**Research in agricultural chemistry in relation to plant breeding**).

Lanbouwk. Tijdschr. Wageningen 1942 : 54 : 457-74.

The relation between optimum yield and quality on the one hand and environmental factors on the other are problems which concern both the plant breeder and agricultural chemist. This relationship is analysed in this lecture which deals with the study of the soil conditions which will provide the best and most economical environment for a particular crop or variety.

It is recommended that a series of experimental plots should be laid out on different soils representative of the soil types found in Holland and put at the disposal of the plant breeder. This would be of assistance not only in breeding operations but also in regard to the distribution of new varieties.

1527.

DORST, J. C.

575:633:578.08(49.2)

Plantenveredeling. (**Plant breeding**).

Landbouwk. Tijdschr. Wageningen 1942 : 54 : 500-06.

In this paper, which formed the concluding lecture of the series begun by S. J. Wellensiek's address on vegetative propagation (cf. Abst. 1529), the meanings of the term plant breeding and the work of the breeder are defined.

The importance of land races and of induced mutants as a source of gene variation for genetical work is stressed, and the problem of a centralization or decentralization of the breeders' plots is considered with reference to Holland.

In addition, the questions whether the number of varieties and strains in the country should be reduced or whether they should be left to the growers as material from which they can select what they require are discussed.

1528. BOONSTRA, A. E. H. R. 575:633:578.08:581.1

Physiologisch onderzoek en plantenveredeling. (**Physiological research and plant breeding**).

Landbouwk. Tijdschr. Wageningen 1942 : 54 : 437-56.

The intimate relationship which should exist between plant physiology and plant breeding is stressed, and the role of physiological research in breeding for increased yield is examined in detail. Examples are drawn from work already reviewed, on beets (cf. *Plant Breeding Abstracts*, Vol. XVI, Absts 1331 and 1333) to show that many problems of the plant breeder can only be solved by research on physiological problems; and it is suggested that the study of the comparative physiology of varieties of agricultural plants should be established as a new branch of research dealing not so much with comparisons of earliness, winter-hardiness, etc., but with the phenomena of the development and physiological functions of the plant.

1529. 575:633:578.08:581.165

WELLENSIEK, S. J. 633.14:581.165:578.08

Vegetatieve vermeerdering en plantenveredeling, speciaal bij rogge. (**Vegetative multiplication and plant breeding, especially in rye**).

Landbouwk. Tijdschr. Wageningen 1942 : 54 : 422-36.

This lecture, delivered at a holiday course, deals with general problems of vegetative reproduction, with its importance in rye breeding, and with general questions regarding the value and use of the method.

Clonal multiplication could, it is suggested, be used in conjunction with two different methods of rye selection to obtain genetically identical plants for (a) physiological, phytopathological and other comparative studies; (b) the estimation of performance before flowering in hybridization work; (c) multiplication of valuable plants; (d) selection work, studies of variation, and the effect of the pollen on grain size, and determination of the range of pollen dispersal; and (e) the isolation of self-fertile strains.

With a view to systematic crossing of strains on the basis of their performance in the second year, an experiment is in progress to prolong the life of the clones to the third year by removal of the ears and short-day treatment. If successful, this method should enable the breeder to test part of the clone for performance in the second year and reproduce the remainder vegetatively, so that in the third year hybridization of the best clones could be carried out.

The techniques here considered could, it is suggested, be applied to all annual crops and should be of special use for cross-pollinated plants.

The particular features of every crop species should, however, be re-examined in order that vegetative multiplication may be properly applied (cf. also *Plant Breeding Abstracts*, Vol. XVI, p. 365).

1530. HAAN, D. DE 575:633:581.056:576.16

Klimaat en plantenveredeling. (**Climate and plant breeding**).

Landbouwk. Tijdschr. Wageningen 1942 : 54 : 483-99.

This lecture deals with the effect of climate on the origin of cultivated plants and the way in which plant breeding has made it possible in many countries to extend the area of cultivation to climatically unfavourable regions; the importance of plant breeding in obtaining better climatically adapted varieties; selection for resistance to climatic factors; the relation between climate and the distribution of varieties; the method of determining the influences of climate in plant breeding; and the basis of acclimatization.

1531. IRWIN, M. R. 575.1
Immunogenetics.

Advances Genet., N.Y. 1947 : 1 : 133-59.

Investigations throwing light on the genetics of antigens are reviewed.

1532. SONNEBORN, T. M. 575.1

Recent advances in the genetics of *Paramecium* and *Euplotes*.

Advances Genet., N.Y. 1947 : 1 : 263-358.

A review is given of recent investigations on the reproductive behaviour, cytology and genetics of *Paramecium* spp. and *Euplotes patella*. A bibliography of 170 references is appended.

1533. V., A. S.-L. 575.1(47)

La nuova genetica nell' U.R.S.S. (**The new genetics in the U.S.S.R.**).

Tabacco 1947 : 51 : 23-30.

In reviewing the recent publication on this subject by Hudson and Richens (see *Plant Breeding Abstracts*, Vol. XVI, p. 365), a somewhat extended summary of the contents of the monograph is presented for the benefit of Italian readers, the main conclusions being translated into Italian *in extenso*.

1534. VAZ, Z. 575.1:007

A contribuição do prof. Dobzhansky ao desenvolvimento da genética.

(**The contribution of Professor Dobzhansky to the development of genetics**).

Bol. Minist. Agric., Rio de J. 1944 : 33 : No. 1 : 1-24.

This article is a report of the oration delivered by the author on the occasion of the conferment by the University of São Paulo of an honorary degree on Professor Dobzhansky.

It includes a general review of the history of genetics, with special reference to genetical work in Brazil and to the special contributions made by Professor Dobzhansky.

1535. 575.1:35(83)

Inauguración del Laboratorio de Citogenética del Departamento de Genética y Fitotecnica del Ministerio de Agricultura. (**Inauguration of the Laboratory of Cytogenetics of the Department of Genetics and Plant Breeding of the Ministry of Agriculture**).

Agric. Tec. Chile 1946 : 6 : p. 181.

A laboratory for cytogenetical research has been founded under the auspices of the Chilean Ministry of Agriculture and the Rockefeller Foundation.

1536. WINGE, Ö. 575.116.1

On the possibility of cross-over percentages over 50.

C.R. Lab. Carlsberg, Sér. Physiol. 1935 : 21 : 59-76.

Assuming that crossing-over occurs at the single strand stage, the effect of the following three conditions of interference upon crossing-over are calculated and theoretically discussed: (1) minimum interference; (2) an interference of 80% between neighbouring sections of the chromosome measuring 10 centimorgan units in length, within which length no double crossing over is assumed to be possible, the interference being continually halved by each intermediate section of the chromosome so that it is 40% between next but one neighbouring sections, 20% between next but two neighbouring sections, and so on; and (3) a similar degree of interference to that in condition (2) but which falls off and rises rhythmically so that 80% interference is operative between neighbouring sections, 40% between next but one neighbouring section, then a sequence of 20%, 0%, 20%, 40%, 80%, 40% interference and so on. It is calculated that under condition (1) the maximum crossing-over value will be 50%. Under condition (2) the maximum crossing-over value is estimated as approximately 50.75%, for genes 120-130 centimorgan units apart. Under condition (3) the highest obtainable crossing-over value is calculated as 55.2%, for genes 110-120 centimorgan units apart. In both the latter cases, the crossing-over value approached 50% with increase in the distance between the two genes.

* General studies, see also individual crops.

The author points out that the experimental maximum crossing-over value of 50% cannot serve as an argument in support of the view that crossing-over occurs at the double strand stage, since, even if the process takes place at the single strand stage, the crossing-over value would hardly exceed 50%.

The author also suggests that interference must assert itself most strongly in the middle region of the chromosome, and most weakly in the subterminal portions. A given estimated crossing-over value will therefore correspond to a greater chromosome length in the more central part of the chromosome than if it refers to subterminally located genes.

1537. SMITH, L. 575.116.4:633.11

A simplified method for establishing the three-point order of genes from F₃ data.

J. Amer. Soc. Agron. 1947 : 39 : 353-55.

A method is described by means of which the data from F₃ progeny tests of small populations of single recessive plants can be used for establishing the linear order of three linked genes. An example is given of the use of the method in determining the order of the three genes in diploid wheat, viz. *e*-2 for early maturity, *yx*-2 for virescent seedling and *yg* for yellow-green seedling.

1538. OLÁH, L. 575.14

Über die Ursachen der durch Inzucht entstehenden Depression. (The causes of inbreeding depression).

Bull. Hung. Coll. Hort. 1941 : 7 : 204-21.

The author gives a general review of the causes of the losses in vigour brought about by inbreeding, based mainly on the work of Müntzing. The plasma theory of H. Nilsson is criticized. The author carried out investigations to compare the percentages of good pollen produced by self-pollinated and cross-pollinated species. T. P. B.

1539. HENDERSON, J. H. M. 575.17

Biochemical genetics.

Science 1947 : 105 : p. 522.

In view of recent criticisms by Spiegelman and Kamen of the traditional theory of the gene (cf. Abst. 571), the author draws attention to the earlier criticisms along comparable lines published by E. E. Just.

1540. BEADLE, G. W. 575.17:576.1

The gene.

Proc. Amer. Phil. Soc. 1946 : 90 : 422-31.

The nature of the gene and its action are discussed, with particular reference to the gene-controlled biochemical reactions of *Neurospora*. The evolution of the gene and living organisms is considered, from the aspects of retrogressive evolution from autotrophic forms, and the possible origin of the protogene and the progressive evolution of self-duplicating autotrophic systems from the protogene, as suggested by Oparin and Horowitz.

VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

1541. BALL, C. R. 575.2:582

More plant study: fewer plant names.

J. Arnold Arbor. 1946 : 27 : 371-85.

The range in phenotypic expression possible in the case of single plant species is described with special reference to the genus *Salix*. It is suggested that many described species are but phenotypic modifications of others.

1542. 575.22

EPLING, C. 582:575.127.2

Actual and potential gene flow in natural populations.

Amer. Nat. 1947 : 81 : 104-13.

Examples are quoted from the genera *Arctostaphylos*, *Salvia* and *Delphinium* to show that sympatric species may retain their identity even though they are sufficiently compatible to form natural hybrids and back-crosses. It is suggested in explanation that competition between the hybrids and the parental species would be wholly in favour of the latter, so

that the chance of the hybrid becoming ascendant is slight. Should external conditions change, however, natural selection might well favour a hybrid at the expense of one or both of its parents.

1543. BLARINGHEM, L. 575.22:582
 Les espèces jordaniennes et la disjonction des espèces. (**Jordanian species and the segregation of species**).
 Bull. Soc. Bot. Fr. 1945 : 92 : 20-23.

An appreciative account is given of the methods and principles adopted by Jordan in analysing intraspecific variation and the hereditary transmission of the characters of the variants.

1544. REINHOLZ, E. 575.243:537.531:575:633
 Auslösung von Röntgen-mutationen bei *Arabidopsis Thaliana* (L.) Heynh. und ihre Bedeutung für die Pflanzenzüchtung und Evolutionstheorie. [**X-ray mutations in *A. Thaliana* (L.) Heynh. and their significance for plant breeding and the theory of evolution**].
 Office of Military Government for Germany (U.S.) 1947 : Fiat Rep. No. 1006 : Pp. 70.

Research was carried out to discover whether in the case of *A. Thaliana*, X-rays can elicit mutations with a positive selection value. A pure line En from Enkheim near Frankfurt, with a spontaneous rate of mutation estimated as 0.1% or 0.2%, was used.

An unexpectedly large number of variations appeared; in some cases the plant was so altered as to be difficult to recognize as of the genus *Arabidopsis*. The various forms of mutations are tabulated, including a group of mutations with chlorophyll changes.

Increased dosage produced increased mutation rate. The results tabulated, regardless of whether the variations have been proved heritable or not, seemed to show that differences in dosage have no effect on the degree of the resulting changes in leaf form or chlorophyll content, but variations in pubescence and form of pod result apparently only from doses of 3000r; further experiments are, however, needed to confirm this conclusion as regards pubescence.

Hybridization is shown to be the only sure method of finding the number of genes altered. The mutations are mainly recessive; in 26 cases of heritable variation only one has been proved dominant. A large number of the mutants were of unimpaired vitality. The writer holds that lethal mutations and monstrosities are not due to a new gene disturbing the gene-environment harmony, but that either a function of the gene essential to vitality is lacking, or that the new gene inhibits the course of the reactions. Thus the origin of the capacity to develop is primarily endogenic.

Six examples of mutant characters obtained are described, which, if elicited in economic plants, could be of value. The mutant *glabra* is of special interest. Glabrousness in the mutants could be shown to be a unifactorially segregating recessive character. The gene concerned is probably identical with that which Laibach found to cause absence of pubescence in wild races of *Arabidopsis*.

Experiments will be made to test whether by irradiating the mutants the original forms could be obtained.

Distinctive characters, e.g. shape of leaf, shortened petiole and large seeds, of wild forms of *Arabidopsis* which have a positive selection value and which have their counterparts in the mutants obtained are discussed.

The results show that X-ray irradiation could elicit mutations of value to the practical breeder and that the method is also useful in the experimental study of mutation.

A cytological analysis of the mutants is to be made later.

E. W.

1545. MOL, W. E. DE 575.243:575.247
 Na het vijftiende jaar röntgenbestraling van tulpen ter verkrijging van knopmutaties. (**After fifteen years of X-ray irradiation of tulips in order to obtain bud mutations**).

Landbouwk. Tijdschr. Wageningen 1944 : 56 : 173-90.

A full survey is given of the work and results obtained since 1928, which include the

production of 98 bud mutations in 37 different varieties. Relevant literature is also reviewed.

1546.

DEMEREK, M.

575.243:581.04

576.356:581.04

Production of mutations in *Drosophila* by treatment with some carcinogens.

Science 1947 : 105 : p. 634. (Abst.).

Mutations have been induced in *Drosophila* by methyl-bis (β -chloroethyl) amine and the four carcinogens, 1, 2, 5, 6-dibenzanthracene, methyl cholanthrene, benzpyrene and β -naphthylamine. Aerosols were used in each case. Chromosomal aberrations were obtained with the nitrogen mustard and the dibenzanthracene.

SELECTION 575.4

1547. DOBZHANSKY, T. and

WRIGHT, S.

575.41

Genetics of natural populations. XV. Rate of diffusion of a mutant gene through a population of *Drosophila pseudoobscura*.

Genetics 1947 : 32 : 303-24.

Experiments on the dispersion rates of *D. pseudoobscura* flies carrying the recessive gene for orange eye are reported.

ORIGIN OF SPECIES 576.1

1548.

LAM, H. J.

576.12

567.16

Hedendaagsche opvattingen over evolutie en phylogenie. (**Present day views of evolution and phylogeny**).

Vakbl. Biol. 1943 : 24 : No. 7 : 73-81.

The author prefaces a review of Heberer's *Die Evolution des Organismen, Ergebnisse und Probleme der Abstammungslehre* (*The evolution of organisms, results and problems of phylogeny*) by a documented survey of the present position in regard to these two problems and his own particular attitude to them.

1549.

HAAS, O. and

SIMPSON, G. G.

576.12:001.4

Analysis of some phylogenetic terms, with attempts at redefinition.

Proc. Amer. Phil. Soc. 1946 : 90 : 319-49.

The terms homology (homogeny), analogy, homoplasy, divergence, parallelism, convergence, homeomorphy, time signatures (Zeitsignaturen), homeomorphic recurrence, iteration and many other phylogenetic terms are traced back to their original usages, and critically discussed. A useful index of the terms referred to is appended.

1550.

METZ, C. W.

576.12:575.113.4

576.354.46

Duplication of chromosome parts as a factor in evolution.

Amer. Nat. 1947 : 81 : 81-103.

In a discussion on the evolution of the genetic material of the chromosomes, the author develops the theory that this has largely come about by means of duplications of various sizes. The possibility is mentioned that the triple repeat in the X chromosome of *Sciara* spp., in which synaptic attraction occurs only between the segment at one end and either of the other two duplications but never between the latter two, represents a differentiation in the degree of chromosomal homology.

1551.

LYSENKO, T. D.

576.12:631.962.4

(Natural selection and intraspecific competition.)

Agrobiologija (Agrobiology) 1946 : No. 2 : 3-27.

This is the same material as that reviewed in *Plant Breeding Abstracts*, Vol. XVII, Abst. 585.

1552. BABCOCK, E. B. 576.16
Cytogenetics and speciation in *Crepis*.

Advances Genet., N.Y. 1947 : 1 : 69-93.

The author summarizes investigations throwing light on the course of speciation in the genus *Crepis*, under the following headings: reciprocal translocation between non-homologous chromosomes, gene mutation, interspecific hybridization, polyploidy and apomixis.

1553. CLAUSEN, J.,
 KECK, D. D. and
 HIESEY, W. M. 576.16:575.11:582

Heredity of geographically and ecologically isolated races.

Amer. Nat. 1947 : 81 : 114-33.

A genetical analysis of isolated races of various Californian Compositae has shown that the differences between them are controlled in general by the interaction of many genes. Morphological differentiation of an extent often used to demarcate genera may yet be accompanied by full interfertility, as between *Layia glandulosa* and *L. g.* var. *discoidea* (*Roxira serpentina*).

1554. SPENCER, W. P. 576.16:575.24

Mutations in wild populations in *Drosophila*.

Advances Genet., N.Y. 1947 : 1 : 359-402.

Investigations on mutations in wild populations of *Drosophila* are critically summarized.

*CYTOLOGY 576.3

1555. HOLLANDE, A.-CH. and
 HOLLANDE, G. 576.312:576.12

L'origine du noyau de la cellule. (**The origin of the nucleus of the cell**).

Bull. Soc. Bot. Fr. 1945 : 92 : 57-59.

Four stages in the evolution of the nucleus are postulated, viz. (1) the spiremosolenosome represented by the spores of *Bacillus enterothrix*, (2) the prospiremoid of the Cyanophyceae, (3) the spiremoid of higher plants and animals, and (4) the formation of a nuclear membrane by flocculation of the micelles surrounding the nucleus.

1556. ROSEN, G. VON 576.312.32:578.65

The rapid nigrosine method for chromosome counts, applicable to all the growing tissues of the plant.

Hereditas, Lund 1947 : 33 : 567-70. (Abst.).

The following technique is recommended for staining chromosomes. Fix the material in a mixture of one part of 98% acetic acid to two parts of 95% ethyl alcohol. Then loosen the tissues in a mixture of one part of concentrated HCl to two parts of 95% alcohol. Wash in distilled water. Finally stain in a 3% or 4% solution of nigrosin in 50% acetic acid.

1557. BUCHHOLZ, J. T. 576.312.34:578.6.633.15

Chromosome structure under the electron microscope.

Science 1947 : 105 : 607-10.

The following details are given on the appearance of the prophase chromosomes of maize. The chromonema varies in thickness between 30 and 100 m μ ; in places it appears to be flattened. To it, granules are attached, usually laterally and often in pairs. The granules vary considerably in size, shape and electron transparency. The chromomeres of light microscopy may either be granules or snarls in the chromonema.

It is uncertain which of these structures or combination of structures represents the gene.

1558. RESENDE, F.
 SALORD, J. and
 LEITE-RIO, L. 576.312.34:581.036

Structure of chromosomes as observed in root-tips. IV.—Olistherochromatin and chromosomic contraction.

Portugaliae Acta Biologica, Lisboa 1946 : 1 : Sér. A. 412-15.

The chromosomes of young parts of *Trillium* spp. contract more readily under the influence of raised temperatures than old parts.

* General studies, see also individual crops.

It is also stated that the rarefaction of chromatin induced in olistherochromatin by low temperatures is not caused by deficient metabolism.

1559. KARTASHOVA, N. N. 576.35:581.04:576.311

On the treatment of vegetable cells with colchicine.

C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : 46 : 372-74.

The effect of colchicine treatment upon the viscosity of the cytoplasm was determined by centrifuge experiments, using the stems of *Lycopersicon esculentum* and *Sedum* sp. and also the petioles of young leaves of *Aegopodium Podagaria*, *Primula obconica* and *Pelargonium zonale*. The degree of viscosity was estimated by the displacement of the plastids. Increases in cytoplasmic viscosity were recorded in the colchicine treated material. It is suggested that such changes in the normal viscosity of the cytoplasm may prevent the formation of achromatic spindles in colchicine-treated cells.

1560. GAJEWSKI, W. 576.354.4:575.129(43.8)

Cytogenetic investigations on *Anemone* L. I. *Anemone Janeczewskii* a new amphidiploid species of hybrid origin.

Acta Soc. Bot. Polon. 1946 : 17 : 129-94.

Cytological investigations are reported on the amphidiploid ($n = 24$) produced in the F_2 generation of the hybrid between *A. multifida* ($n = 16$) and *A. sylvestris* ($n = 8$); the amphidiploids were derived from F_1 triploid plants. Hexaploid plants identical with the F_2 amphidiploids were obtained from various sources, and it is believed that they have arisen in a similar way from hybrids between *A. multifida* and *A. sylvestris*; they are described as a new species under the name of *A. Janeczewskii*.

The mode of origin of amphidiploids and the causes of infertility in amphidiploids are generally discussed.

1561. FERNANDES, A. 576.356

Sur le comportement des chromosomes surnuméraires hétérochromatiques pendant la méiose. I. Chromosomes longs hétérobrachiaux. (The behaviour of supernumerary heterochromatic chromosomes during meiosis. I. Long heterobrachial chromosomes).

Bol. Soc. Broteriana 1946 : 20 : 93-154.

A description is given of the behaviour during meiosis of the supernumerary heterochromatic chromosomes of *Narcissus Bulbocodium* L. These undergo non-homologous pairing with each other, and probably cross over illegitimately.

During metaphase, their behaviour is variable; they may proceed to the poles, or may remain in the cytoplasm to form micronuclei.

1562. FERNANDES, A. 576.356

Sur le devenir des micronoyaux formés à la microsporogénèse. (The fate of the micronuclei formed at microsporogenesis).

Bol. Soc. Broteriana 1946 : 20 : 181-200.

The univalents formed during pollen meiosis in *Narcissus jonquilloides* Willk. become associated into micronuclei which may either remain in the cytoplasm and degenerate, or may fuse either with the vegetative or generative nuclei of the pollen grain. Their fate after fusing with the generative nucleus is uncertain, but it is suggested that they may sometimes persist as supernumerary chromosomes, their euchromatin being converted to heterochromatin.

1563. STEBBINS, G. L. (JUN.) 576.356.5

Types of polyploids: their classification and significance.

Advances Genet., N.Y. 1947 : 1 : 403-29.

The problem of classifying the types of polyploids satisfactorily is discussed, and a review is given of recent literature on the cytogenetics of polyploids.

1564. CRESCINI, F. 576.356.5:581.04

Genesi sperimentale di nuove forme coltivate e possibilità dei mezzi attuali. (Experimental production of new cultivated forms and the possibilities of the present methods).

Ital. Agric. 1941 : 78 : 13-20.

The importance of polyploidy in the origin of cultivated plants and of new agricultural

varieties is expounded, and the various means by which polyploidy may be induced are outlined; these include temperature treatment, electromagnetic treatment, various forms of irradiation, various mechanical treatments such as centrifuging, decapitation, etc., and finally chemical methods such as those involving colchicine. The main characteristics of polyploids are defined and the conclusion is reached that, interesting as they are, their properties are not such as to make the induction of polyploidy supersede the standard methods of hybridization in the production of improved plant forms.

1565. LEVAN, A. and
STEINEGGER, E. 576.356.5:581.04
The resistance of *Colchicum* and *Bulbocodium* to the c-mitotic action of colchicine.
Hereditas, Lund 1947 : 33 : 552-66.

C. autumnale and *B. vernum* are unaffected by colchicine up to 20% in concentration. *Colchicum* is more resistant than *Allium* to the induction of c-mitosis by *iso*-colchicine or acenaphthene.

It is suggested that the results of other investigators, who have reported susceptibility of *Colchicum* to the induction of c-mitosis by colchicine, may be due to their having used colchicine crystallized from chloroform, which exerts a c-mitotic effect of its own on *Colchicum*.

1566. MASCRÉ, M. and
DEYSSON, G. 576.356.5:581.04
Propriétés mitoclasiques de l'ésérine. (C-mitotic properties of eserin).
Bull. Soc. Bot. Fr. 1944 : 91 : 206-09.

Eserin has c-mitotic properties similar to those of phenylurethane though less intense. The principal effects are the production of stathmocines and hemicines and a general depressive effect on mitosis.

1567. MENEZES, O. B. DE 576.356.5:581.04
Poliploidia, indução e colquicina. (Polyploidy, induction and colchicine).
Bol. Minist. Agric. Rio de J. 1944 : 33 : 1-16.

An illustrated account is given of the induction of polyploidy by means of colchicine, the characteristics of polyploids, and their value in plant breeding. Reference is made to the author's own researches on the effect of colchicine on *Neoglaziova variegata*.

1568. MASCRE, M. and
DEYSSON, G. 576.356.5:581.04:635.25
Action mitoclasique du camphre. (C-mitotic action of camphor).
Bull. Soc. Bot. Fr. 1945 : 92 : 103-04.

Camphor retards mitosis in *Allium Cepa*, and tends, at suitable concentrations, to produce tumours.

1569. STEINEGGER, E. and
LEVAN, A. 576.356.5:581.04:635.25
The cytological effect of chloroform and colchicine on *Allium*.
Hereditas, Lund 1947 : 33 : 515-25.

At high concentrations, chloroform dissolves the chromosomes; at lower concentrations, c-mitotic disturbances are induced. There is, however, insufficient chloroform present in colchicine crystallized from this solvent for it to exercise a separate c-mitotic activity.

1570. SULLIVAN, B. J. and
WECHSLER, H. I. 576.356.5:581.04:635.25
The cytological effects of podophyllin.
Science 1947 : 105 : p. 433.

Impairment of spindle formation has been observed after treating the root tips of *Allium Cepa* with a saturated solution of podophyllin, the resin obtained from *Podophyllum* spp.

1571. CORTVRIENDT, S. F.
 HOLDER, J. VAN and
 VERKISSEN, G. 577.17:581.165.72:633(49.2)
 Proeven over het gebruik van groeistoffen bij het stekken van allerlei
 gewassen. (**Experiments on the use of growth substances in
 raising cuttings of various plants**).
 Meded. Landbouwhogeschool Gent 1947 : 12 : 13-62.

A progress report is given on experiments with various growth hormones in the multiplication of various plants by cuttings. Both scientific and practical aspects are considered.

MICROSCOPIC TECHNIQUE 578.6

1572. LA COUR, L. F. 578.6
Improvements in plant cytological technique. II.
 Bot. Rev. 1947 : 13 : 216-40.

This review summarizes recently developed cytological techniques, including fixation methods, smears, squashes, Feulgen staining, the paraffin method, staining with basic fuchsin or crystal violet, pre-treatment of chromosomes for elucidating fine structure, testing for heterochromatin, and specific chemical tests.

1573. WICKS, L. F.
 CARRUTHERS, C. and
 RITCHEY, M. G. 578.6
The Piccolyte resins as microscopic mounting media.
 Stain Tech. 1946 : 21 : 121-26.

In view of the recent scarcity of Canada balsam, a considerable number of the newer synthetic resins were tested as permanent mounting media. The Piccolyte series of resins (β -pinene polymers) proved to be entirely satisfactory for this purpose.

1574. LOWE, J. 578.6:633.15:576.312.35
Root tip smears for maize.
 Stain Tech. 1946 : 21 : 127-28.

The following technique is suggested as a simple alternative to the paraffin sectioning method, in making chromosome counts in the root tips of maize. Young and actively growing root tips are fixed in Carnoy's fluid for 6-24 hours. The material can be kept in 70% ethyl alcohol until convenient! It is next transferred to equal parts of hydrochloric acid and 95% ethyl alcohol for five minutes, then to 70% ethyl alcohol for five minutes. A thin free-hand cross-section of the root tip is put into a drop of acetocarmine on a slide, and teased apart or flattened out. A cover glass is applied, and the slide passed several times through a flame. A good preparation will show the cells well separated but intact and many well-stained mitotic figures. The slides may be used as temporary mounts if sealed with a gum-mastic paraffin mixture and kept in a cool place, or may be made permanent by McClintock's method.

1575. SALAZAR, A. L. 578.65
A new technic: tannin-iron II.
 Stain Tech. 1946 : 21 : 149-51.

A staining technique is described consisting of successive mordanting in tannic acid and iron alum, with washing in water between each bath. The technique is designated the tannin-iron II method, to distinguish it from an earlier method using tannic acid and iron alum proposed by the author. After complete or partial reaction, differentiation can be effected with hydrochloric alcohol, tannic acid or "picric tannin". The reaction is positive with any fixative. Like the reaction of the tannin-iron method I, the reaction of method II colours only proteins. It is stated that the tannin-iron II technique is useful in studying the structure of cytoplasm, and has given new results in animal and plant cytology, and the cytology of tumours.

1576. REZENDE-PINTO, M. C. DE 578.65:576.312.315
 A new cytological technic, tannin-iron III, for nucleoli and plastids. 578.65:581.174
 Stain Tech. 1947 : 22 : 3-4.

A modification of the tannin-iron I method proposed by Salazar is described, under the name of the tannin-iron III technique. The method described is specific for certain cellular structures, this specificity of reaction arising from previous hydrolysis in normal hydrochloric acid. By this technique, the nucleoli and "grana" of the plastids acquire a specific secondary tannophyly although they are not originally tannophylic.

1577. SMITH, L. 578.65:576.312.32
 The acetocarmine smear technic.
 Stain Tech. 1947 : 22 : 17-31.

A detailed account of the acetocarmine smear method is given, including special procedures for studying plant chromosomes at prophase, condensed chromosomes during meiosis and mitosis, mitosis in microspores, coiled chromonemata, and the chromosomes of the salivary glands of Diptera. Methods of making temporary acetocarmine slides into permanent ones are also outlined.

1578. STOWELL, R. E. 578.65:581.192:576.312.32
 The specificity of the Feulgen reaction for thymonucleic acid.
 Stain Tech. 1946 : 21 : 137-48.

The results of experiments carried out on the specificity of the Feulgen reaction for thymonucleic acid do not support the observations of Carr, who has expressed the view that the Feulgen reaction is non-specific (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 21). The author discusses the evidence for and against specificity, and concludes, in agreement with the majority of investigators, that when properly controlled the Feulgen reaction is relatively specific for thymonucleic acid.

1579. CUTTER, V. M. 578.65:632.421.9:576.312.32
 Smear methods for the study of chromosomes in ascomycetes.
 Stain Tech. 1946 : 21 : 129-31.

Several modifications of the acetocarmine smear technique are recommended, which have been found valuable in meiotic investigations on *Neurospora*. Satisfactory results have also been obtained by the same methods in the study of mitotic chromosomes in *Neurospora*. In addition, it is considered that the modifications described should prove useful in investigations on other ascomycetes.

*BOTANY 58

1580. Roodenburg, J. W. M. 581.143.26.035.1
 Daglengte, bloemvorming en bloei. (Length of day, flower formation and flowering).
 Vakbl. Biol. 1947 : 27 : 65-77.

A comprehensive and critical survey is given of the contribution of Dutch, American, English and Russian investigators. The discussion covers the following aspects: season of flowering; length of day; temperature effect; winter resting period; winter flowering; growth in length; flower bud formation; intensity and length of illumination; and the effect of the spectral composition of the light.

1581. Gimesi, N. 581.331.2:635.62(43.91)
 A *Cucurbita pepo* pollenexinégének keletkezése és fejlődése. (Origin and ontogeny of the pollen exine of *C. pepo*).
 Bull. Hung. Coll. Hort. 1941 : 7 : 139-45.

The centrifugal thickening of the exine of pollen grains from *C. Pepo* is produced by an intussusceptional growth of the inner protoplasm of the microspores. It is suggested that apparently each chromosome or each part of a chromosome is able to direct the growing of the cell wall. T. P. B.

* General studies, see also individual crops.

1582.

582:576.16:061.3(47)

Botanists in conference.

Soviet News 1947 : No. 1746 : p. 4.

A conference on the morphological and anatomical problems in plants, attended by 150 scientists, has been held under the auspices of the Botany Institute of the U.S.S.R. Academy of Sciences in Leningrad. Soviet botanists are reported to be working on a new system of plant classification based upon a study of the evolutionary development of the plant, described as less static than the Linnaean system. The majority of the 60 papers read at the conference were devoted to this problem. The conference also discussed experimentally produced mutations in relation to breeding of new forms of grain, fruit and vegetable crops.

1583.

GUYOT, A. L.

582:633-2.4-1.521.6

Critères biologiques et systématique végétale. (**Biological criteria and plant systematics**).

Bull. Soc. Bot. Fr. 1945 : 92 : 143-46.

After mentioning how embryological, genetic, ecological and biochemical studies may assist in evaluating taxonomic affinity, the author shows how the host range of parasitic fungi, especially rusts, may be used similarly.

***DISEASES AND INJURIES, BACTERIA, FUNGI 632**

1584.

632.3:535.61-31:631.521.6:575.242

WITKIN, E. M.

632.3:537.531:631.521.6:575.242

Genetics of resistance to radiation in *Escherichia coli*.

Genetics 1947 : 32 : 221-48.

A spontaneous mutation in *E. coli* giving rise to relative resistance to ultra-violet light and X-irradiation has been previously reported (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1670). The present paper gives a more complete account of the preliminary investigations, and of additional experiments on the genetic basis of resistance to radiation.

The properties of a resistant strain, designated B/r, which was derived by culturing one of the four colonies surviving after treatment of the parent strain B with ultra-violet light, were further investigated. The B/r strain was found to possess stable, heritable resistance to both the division-inhibiting and lethal effect of radiation, and resistance to the lethal and division-inhibiting action of penicillin and sodium sulphathiazole. Experiments on the growth rates of strains B and B/r showed that strain B/r has a shorter lag phase in broth at 37° C. than the parent strain, and a somewhat lower final titre.

By means of a technique designated the double-irradiation treatment, evidence was obtained indicating that the resistant mutants were spontaneous and were present prior to the radiation treatment.

The spontaneous mutation rate was estimated as approximately 10^{-5} mutations per bacterium per generation. It was found that the rate of mutation to resistance could be increased considerably by induction due to high doses of ultra-violet light.

Among the radiation resistant mutants, four independent mutations were observed, viz. mutants resistant to both penicillin and sulphathiazole, mutants resistant to penicillin but not to sulphathiazole, mutants resistant to both, or mutants resistant to neither.

When associated with resistance to penicillin, resistance to radiation behaved as a "modifier" of the mutation to penicillin resistance, adding quantitatively to the effect of the latter.

Preliminary experiments were also carried out on the factors controlling selection in mixed populations. When strains B or B/r were artificially mixed under conditions of daily serial transfer to fresh media, neither strain was found to have a selective advantage. Under the conditions of aging broth cultures, strain B/r showed a marked selective disadvantage in mixture with strain B, approaching complete lethality.

The results are discussed with reference to the possible mechanisms of resistance to radiation.

* General studies, see also individual crops.

1585. STONE, W. S.,
WYSS, O. and
HAAS, F. 632.3:537.531:575.243
The production of mutations in *Staphylococcus aureus* by irradiation of the substrate.
Proc. Nat. Acad. Sci. Wash. 1947 : 33 : 59-66.

Mutants of *S. aureus* resistant either to penicillin or streptomycin have been induced by irradiating the substrate before plating out. This occurred both with broth and with an artificial medium. By irradiating the components of the artificial medium separately, it was discovered that irradiation of the amino-acids only would increase the mutation rate.

1586. LAMPEN, J. O.
JONES, M. J. and
PERKINS, A. B. 632.3:537.531:575.243
Studies on the sulfur metabolism of *Escherichia coli*. I. The growth characteristics and metabolism of a mutant strain requiring methionine.
Arch. Biochem. 1947 : 13 : 33-45.

Investigations are reported on an X-ray induced mutant strain of *E. coli*, designated strain 532-171, which requires methionine for its growth. The response of this mutant to *l*-methionine, *d*-methionine, and *dl*-methionine and to various related compounds is described. An inverse relation between the growth rate and the efficiency of methionine utilization was found.

1587. LAMPEN, J. O. and
JONES, M. J. 632.3:537.531:575.243
Studies on the sulfur metabolism of *Escherichia coli*. II. Interrelations of norleucine and methionine in the nutrition of *Escherichia coli* and of a methionine-requiring mutant of *Escherichia coli*.
Arch. Biochem. 1947 : 13 : 47-53.

Experiments are reported indicating that in the normal form of *E. coli* the primary action of norleucine is to inhibit the utilization of methionine rather than its synthesis. In experiments on mutant 532-171 (cf. Abst. 1586), an increased final response to methionine in presence of norleucine was found under conditions of partial inhibition of the growth rate. Possible explanations of the increased efficiency of methionine utilization under these conditions of slower growth are discussed.

1588. LAMPEN, J. O.,
ROEPKE, R. R. and
JONES, M. J. 632.3:537.531:581.04:575.243
Studies on the sulfur metabolism of *Escherichia coli*. III. Mutant strains of *Escherichia coli* unable to utilize sulfate for their complete sulfur requirements.
Arch. Biochem. 1947 : 13 : 55-66.

The response of 13 X-ray and chemically induced mutant strains of *E. coli* unable to use sulphate to various sulphur containing substances was investigated.

1589. OAKBERG, E. F. and
LURIA, S. E. 632.3:581.04:631.521.6:575.242
Mutations to sulfonamide resistance in *Staphylococcus aureus*.
Genetics 1947 : 32 : 249-61.

Evidence has been obtained that resistance to sodium sulphonamide in *S. aureus* is the result of mutation and selection. Calculated from the percentage of cultures containing no resistant cells, the mutation rate from sensitivity to resistance was estimated as ranging from 2×10^{-9} to 4×10^{-10} per bacterium per generation. The minimum number of mutations concerned is probably five; the maximum number may be considerably larger. Except for the increased *p*-aminobenzoic acid production associated with one and possibly two mutations, no criterion was found for differentiating mutants from different strains. It

therefore appears as if several cell mechanisms are concerned in reaction to sulphonamides. Bacteria with low drug tolerance were found to be relatively frequent, and if established as a strain subsequently produced mutants with higher resistance. It is therefore suggested that therapeutic treatments should be as intensive as possible in order to preclude the production of primary resistant mutants and the subsequent selection of secondary mutants with still higher resistance.

1590. SIMMONDS, S.,
TATUM, E. L. and 632.3:581.192:537.531:575.243
FRUTON, J. S. 632.3:581.192:581.04:575.243
The utilization of phenylalanine and tyrosine derivatives by mutant strains of *Escherichia coli*.
J. Biol. Chem. 1947 : 169 : 91-101.

Data are given on the utilization of derivatives of phenylalanine or tyrosine by four mutant strains of *E. coli* unable to synthesize these compounds. One of the mutant strains, designated 58-278, requiring phenylalanine, was obtained by X-irradiation of mutant 58 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 167). Strains 58-4899 and 58-6314 unable to synthesize phenylalanine, and strain 58-5030 requiring tyrosine, were produced by exposure of strain 58 to methyl-*bis* (β -chloroethyl) amine.

1591. STAKMAN, E. C. 632.4:576.16
The nature and importance of physiologic specialization in phytopathogenic fungi.
Science 1947 : 105 : 627-32.

A comprehensive review is presented of the problem of physiological specialization in the fungi, in particular in the Uredinales and Ustilaginales. Among the topics discussed are the different nature of physiological races in the rusts and smuts respectively, the effects of environment, mutation, semi-permanent modification, hybridization and the development and spread of new races.

1592. 632.4:576.16:633-1.521.6
QUANJER, H. H. 632.8:576.16:633-1.521.6
Specialisatie van plantenparasieten en anatomisch-fysiologisch onderzoek ter verklaring daarvan. (**The specialization of plant parasites and anatomical and physiological investigations to explain it**).
Landbouwk. Tijdschr. 1943 : 55 : 532-33.

In this resumé of a holiday course lecture given in Wageningen, some general views on specialization of parasites and viruses, and on susceptibility and resistance of hosts, were formulated on the body of experimental evidence available on the subject.

1593. BONNER, D. 632.421.2:577.1:537.531:575.243
Studies on the biosynthesis of penicillin.
Arch. Biochem. 1947 : 13 : 1-9.

X-ray induced mutants of *Penicillium notatum* which produced little or no penicillin were investigated with a view to the possible production and identification of natural precursors of penicillin, and their response to compounds known to act as precursors. In tests of 53 mutant strains grown in mixed culture, in all combinations of two at a time, no penicillin production was observed, nor did any compound and combination of compounds promote penicillin production in cultures of single strains. Mutant strains with various nutritional deficiencies were also tested for penicillin production. Strains requiring lysine were the only ones found to be defective in the synthesis of penicillin.

1594. 632.421.6:576.16:633.32
FRANDSEN, K. J. 633.32-2.421.6-1.521.6:575(48.9)
Studier over *Sclerotinia trifoliorum* Eriksson. (**Studies on *S. trifoliorum* Eriksson**).
Danske Forlag, København 1946 : Pp. 220.

This comprehensive study of *S. Trifoliorum*, begun in 1938, deals fully with the technique of infection; the occurrence of the fungus on crop plants and weeds; the biology of *S. Trifoliorum*, including cytological investigations on reproduction; work on variations

affecting morphological and physiological features such as its growth rate and virulence; and ecology.

There is also a section devoted to the control of *S. Trifoliorum* by breeding resistant strains of clover. Evidence is advanced to show that it is probable that there are differences in the virulence of populations of the fungus from widely separated areas, e.g. from Denmark and Finland or from northern and southern Sweden. Nevertheless, the author does not advocate an attempt to recognize such populations as constant entities, and holds that the delimitation of physiological forms of *S. Trifoliorum* would be artificial and useless. The biotypes in the populations of this fungus are not comparable with races such as those recorded in the rusts, and might, if necessary, be best described as "types of attack" to indicate that they differ in virulence.

In the red clover breeding material so far examined, no completely immune plants were found; but from crosses of the resistant strain Øtofte Tidlig [Øtofte Early] and the susceptible Øtofte Halvsildig [Øtofte Semi-late], types with greatly increased resistance have been obtained, and among them also families which appear to combine resistance to *S. Trifoliorum* with the capacity for high yield of dry matter on healthy soil. The Danish strain Hinderupgaard I is also mentioned as exhibiting better resistance than other strains, whereas Hjelm is classed with Øtofte Halvsildig as susceptible.

The text is well provided with tables and good illustrations.

1595. TEMPE, J. DE 632.421.9:581.6:576.356.5:581.02
 Alkaloidvorming door *Claviceps purpurea* (Fr.) Tul. in saprophytische
 cultuur. (**Alkaloid formation by *C. purpurea* (Fr.) Tul. in
 saprophytic culture.**)

Thesis, Univ. Amsterdam 1945 : Pp. 84.

The eighteen strains, provided by the Dutch Central Bureau for Fungus Culture and used in the writer's experiments on alkaloid production by *Claviceps* in saprophytic culture, were obtained from various host genera in Germany, America and Switzerland. Further tests were made with isolates from Spanish, Dutch, Canadian, Polish and Hungarian ergot; though the Spanish isolates provided twice as many alkaloid-forming cultures per cent as all the other isolates together, it proved useless to select strains for high initial capacity, owing to the rapid loss of the alkaloid producing capacity with advancing age.

Evidence was obtained supporting Killian's view that *C. purpurea* is homothallic.

Polyplodization of *C. purpurea* can be induced, but clones with greater average conidial dimensions usually reverted ultimately to normal size and were not superior to non-polyplod material for alkaloid production. In the whole investigation, no single factor inducing alkaloid formation even by strains theoretically capable of the process, could be found.

1596. LEVAN, A. 632.422.3:581.04:576.356.5
Studies on the camphor reaction of yeast.
 Hereditas, Lund 1947 : 33 : 457-514.

The efficiency of the following substances in inducing the camphor reaction (cf-reaction) in yeast has been studied: aliphatic alcohols, ethyl ether, acetone, paraldehyde, chloral hydrate, urethane, veronal, adaline, sulphonal, trichlorethylene, acethylene tetrachloride, avertin, chloretone, chloroform, cyclohexane, bromocyclohexane, camphor, borneol, bornyl acetate, bornyl chloride, camphor oxime, camphoric acid, camphene, terpineol, benzene, methyl derivatives of benzene, nitrobenzene, aniline, phenyl urethane, acetophenone and aromatic alcohols.

The camphor reaction involves a disturbance in the growth of the cell, and often a disturbance of nuclear division. There appears to be a correlation between the power to induce the camphor reaction and the physical properties of the inductor. The threshold concentration at which induction occurs usually lies around the saturation point.

Resistance to the camphor reaction induced by any particular substance may be increased in several cases by growing the yeast in the presence of the inductor.

Low temperature increases susceptibility to the camphor reaction.

1597. OORT, A. J. P. 632.451:576.16:633.11-1.521.6(49.2)
 Het voorkomen van stuifbrand in tarwerassen, die tot nog toe onvatbaar waren. (**The occurrence of loose smut in wheat races hitherto not susceptible**).
 Tijdschr. PlZiekt. 1945 : 51 : p. 89.

Chanteclair and Staring must now join Bersée as varieties which have suddenly begun to exhibit susceptibility in Holland to loose smut, after a long record of immunity to the physiological races one to four of the fungus and also near-immunity from the practical standpoint to races five and six.

It appears that at the C.B. breeding farm in Holland, where artificial infection work has been carried on for many years, a new race has now arisen. The matter is to be investigated.

1598. KOTILA, J. E. 632.485:576.16:575.114
Rhizoctonia foliage blight of sugar beets.
 J. Agric. Res. 1947 : 74 : 289-314.

Experiments on the pathogenicity of a type of *Pellicularia filamentosa* (*R. Solani*) causing a foliage blight on sugar beet are reported. Single basidiospore cultures were found to differ widely in pathogenicity and growth habit. These variations are interpreted as the result of segregation of heritable characters in the haploid form; and it is also suggested that the heterocaryotic nature of the mycelia explains the multiplicity of strains which occurs within the group producing the blight.

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1599. HOWARD, W. L. 633:575:007(73)
Luther Burbank's plant contributions.
 Bull. Calif. Agric. Exp. Sta. 1945 : No. 691 : Pp. 110.

Useful historical information is given on the varieties of agricultural and ornamental plants produced by Burbank.

1600. BOTTAZZI, G. B. 633-1.524(45)
 Il centro di conservazione di ceppi agrari. (**The centre for the maintenance of agricultural strains**).
 Genetica Agraria, Roma 1947 : 1 : 254-75.

The various factors such as temperature, humidity, photoperiodism, and wind and soil properties which may alter the genetical composition of an agricultural variety are discussed. In preserving variety collections for breeding purposes, the effect of these factors must be ruled out as much as possible; this can be done to a large extent by growing the collections in a locality with equable temperature, irrigation, etc. The prerequisites for an adequate centre of maintenance are outlined. These comprise thorough information regarding the climatic conditions of the areas of origin of each variety included in the collection, data on morphological, physiological and cytological characters of the varieties, their agronomic requirements and their industrial and other qualities. An efficient system for keeping the records of all of these characteristics is another prerequisite. The special problems attaching to the conservation of cross-fertilized plants are mentioned; here constant selection and control of the type is called for, combined with suitable crossing to preserve the vigour of the races.

A centre designed on the lines indicated has been founded at the N. Strampelli Cereal Genetics Institute in Rome.

1601. 633-1.524(47)
Plant husbandry.

Agricultural Chron., Moscow 1946 : No. 11. 3-4. (Mimeographed).

It is reported that the U.S.S.R. Institute of Plant Husbandry is resuming its contacts with scientific institutions abroad. During 1945, 13 countries sent 462 samples of cereals, forage grasses and potatoes. Some of the seed samples were sent in exchange for new varieties developed by the Institute of Plant Husbandry and other institutes. Special nurseries are being established for testing the plant material received. The first of these has been built on the Kukkasari Island on Lake Ladoga.

1602. OORT, A. J. P. 633-2-1.521.6:578.08
Ziekteresistentie en plantenveredeling. (**Disease resistance and plant breeding**).
Landbouwk. Tijdschr. Wageningen 1942 : 54 : 474-82.

The problems confronting the plant breeder in attempting to produce new disease resistant varieties of crop plants are illustrated with special reference to the difficulties that arise owing to the capacity of the parasite to adapt itself either to environmental changes or to new varieties and strains of the host. The examples are drawn from the author's work, and from investigations by other workers on *Synchytrium endobioticum* and *Phytophthora infestans* attacking the potato, and the rusts and smuts of cereals.

It is stressed that a thorough knowledge of the parasite as well as the host is necessary in breeding resistant forms of plants.

The difference between apparent and true resistance is shortly discussed.

1603. TJALLAMA, H. T. 633.00.14(49.2)
Lijst van de in 1945 en 1946 door de rijkslandbouwconsulenten en andere instanties genomen veldproeven. (**List of the field trials conducted by the Government legal advisors and other authorities**).
Meded. LandbvoorlichtDienst, Wageningen 1946 : No. 44 : Pp. 100.

This list, the ninth of the series, gives tabulated information for 1945 and 1946 relating to interprovincial trials in Holland of rye, wheat, barley, cabbage, rape, oats, maize, peas, beans, fodder beets, flax, poppy and potatoes, and to grassland and manuring experiments.

CEREALS 633.1

1604. KROTOV, A. S. 633.1:575.127:581.162.5.01
(**Overcoming sterility of a hybrid by prolonging its life**).
Agrobiologija (Agrobiology) 1946 : No. 2 : 123-25.

Triticum x *Agropyron* hybrids in the first year of development formed many ears but all were sterile, whereas in the second year a number of grains were formed, especially as autumn drew near. Observations were made on the grains produced by a hybrid *T. durum* x *T. vulgare* in the main ears, the ears of the lateral tillers, and the ears produced by paternal tillers that were still green, comparing them with similar ears in the control, Lutescens 062. The yield of the main ears in the hybrid represented 33% of the yield of the control, that of the mature side tillers 37% and that of the green side tillers 69%. The fertility of plants obtained from three year old seed was higher than that of plants from fresh seed, in these hybrids and also in *Triticum* x *Agropyron*, wheat x rye and other hybrids.

The general conclusion is reached that the sterility of wide crosses can often be overcome by prolonging the life of the individual.

1605. BONNETT, O. T. and BEVER, W. M. 633.1:575.42:578.08(77.3)
Head-hill method of planting head selections of small grains.
J. Amer. Soc. Agron. 1947 : 39 : 442-45.

A hill method of growing head selections of wheats and oats is described. The method has been found satisfactory at the Illinois Agricultural Experiment Station. The technique can be used not only for growing selections in the preliminary stages of breeding, but also in the purification of new selections or old varieties, and the study of the reaction of varieties and selections to diseases.

1606. FORLANI, R. 633.1:581.162.32
Allogamia in alcuni cereali. (**Cross-fertilization in certain cereals**).
Genetica Agraria, Roma 1947 : 1 : 130-46.

An examination of the published data reveals certain discrepancies regarding the degree of out-pollination characteristic of certain cereal species. The author concludes that these are ascribable both to varietal differences and to differences in behaviour resulting from climatic influences; in barley for instance the flowers never open in bad weather and no crossing can take place, whereas in early flowering varieties the glumes often open and the

pollen is shed and cross-pollination is not exceptional. Abyssinian wheats, when grown in Italy, have been observed by the author to retain their florets open for several hours or even days and hence to be exceptionally subject to intercrossing; this character was preserved after seven or more generations of reproduction.

In 1942 and 1943, emasculated florets of two awned wheat varieties, Mentana and S. Giorgio, were pollinated with a mixture of pollen from the maternal variety and an awnless variety, and the proportion of crosses in the offspring was observed. There were always more hybrids than selfs, the proportion varying from 53% to 73%.

Rye plants were isolated spatially by growing them in the centre of a wheat field at a distance of 50m. or more one from the other; these plants gave an average set of only 1.02% in five successive years. Ears isolated by bagging gave an average set of 3.63% in the same period. Plants grown in a similar wheat field 3m. apart gave a 14% set and others grown 10m. apart 3.82%.

1607. JOHANSSON, E. 633.1-2.7-1.521.6:577.15(48.5)

Studier och försök rörande de på gräs och sädesslag levande tripsarnas biologi och skadegörelse. II. Tripsarnas frekvens och spridning i jämförelse med andra sugande insekters samt deras fröskadegörande betydelse. (**Studies and investigations on the biology and damage to the thrips living on grass and cereals. II. Frequency and distribution of the thrips in comparison with other suctorial insects and the significance of their injury to seed.**)

Medd. Växtskyddanst. Stockh. 1946 : No. 46 : Pp. 59.

Using Scandinavian varieties of cereals, the author reached the following conclusions. Varietal differences in resistance to injury by thrips and hemiptera appear to exist. Late varieties are usually more attacked than early ones. The germinating capacity of pierced kernels is about 10% of normal grains.

Possibly resistance may be related to fermentation in the grains which differs greatly in different varieties; and the more intense the enzyme reaction the greater resistance to injury by suction is likely to be.

WHEAT 633.11

1608. 633.11:575(81)

O trigo nas estações experimentais do sul do país. (**Wheat in the experimental stations in the south of our country.**)

Bol. Minist. Agric., Rio de J. 1944 : 33 : No. 5 : p. 145.

The hybrid wheat Trintecinco Sinvalocho continues to mature early and maintain resistance to rust in southern Brazil. Individual plant selection of the variety Rio Negro in order to produce locally adapted lines is reported.

1609. 633.11:575(81)

Como multiplicar a produção do trigo no País. (**How to increase the production of wheat in our country.**)

Bol. Minist. Agric., Rio de J. 1945 : 34 : 108-09.

A brief account is given of the following newly developed Brazilian wheat varieties: Rio Negro and Frontana, bred at Bagé for Rio Grande do Sul; Floreana, also bred at Bagé but better adapted to conditions in Goiás; and Kenia 155, bred at Patos for Minas Gerais.

1610. FORLANI, R. 633.11:575.12:575.148

Il rin vigorimento delle sementi. La fecondazione incrociata intrarazza del grano. (**Rejuvenation of seeds. Intra-racial cross-fertilization in wheat.**)

Ital. Agric. 1941 : 78 : 127-33.

The following pollinations were made in 1935: Damiano Chiesa x Damiano Chiesa, Virgilio x Virgilio and Rieti II x Rieti II. The pollen in each case was taken from plants of the same variety growing in different fields. Similar crosses were made with the wheats Mentana and Littorio and the naked barley Leonessa in 1936. The product was multiplied for a number of years without further crossing, and in 1939 and 1940 the seed obtained was sown in plots, using plots sown with ordinary seed of the same varieties as controls. In

every case the plots from crossed seed gave a higher yield of grain; the 1000 grain weight was also higher. The differences were more pronounced in the first and second generations after crossing, but persisted up to the sixth and later generations.

The size of the plots sown varied from under 100 to over 4000 square metres, and when the yields are converted to a hectare basis, the differences in favour of the crossed seed varied from 129 to 904 kg.

1611. FORLANI, R. 633.11:575.127:632.421.9:577.17

Sterilità in alcune graminacee e infezioni da *Claviceps* sp. (**Sterility in certain graminaceous plants and infection by *Claviceps* sp.**)

Genetica Agraria, Roma 1947 : 1 : 218-24.

Infection with *C. purpurea* was frequently observed in semi-sterile interspecific wheat hybrids; in completely sterile hybrids on the other hand not much infection has been detected. This, it is thought, may be due to the absence of substances such as vitamin B and naphthalene acetic acid, which are necessary for the development of the fungus and are only formed after fertilization has taken place.

1612. FORLANI, R. 633.11:575.127.5:633.11 *Aegilops*

Ibridi *Triticum* x *Aegilops*. (***Triticum* x *Aegilops* hybrids**).

Genetica Agraria, Roma 1947 : 1 : 237-53.

In the period 1941-1946, crosses were made between *Ae. ovata* and various *Triticum* species in 64 different combinations. The majority of the combinations gave no results; in some, a few hybrid grains were obtained but the resulting plants died; in others the hybrid plants were totally sterile. This last category comprised a number of hybrids of *Ae. ovata* with the hexaploid species. The morphological features of these are described.

Fertile hybrids have been obtained from the cross Mentana x *Ae. ovata* made in 1941; the F_1 plant bore 68 ears, with a total of 1700 florets, from which 4 grains were obtained, all from open pollination; all attempts to obtain seed by artificial pollination with a wide range of different species resulted in failure.

Only two F_2 plants were obtained; both were pollen sterile but had a certain fertility on the female side, and 13 grains were obtained from them, which gave rise however to only 4 F_3 plants. All were fertile but in varying degrees; one of them was highly fertile giving 310 grains from 6 ears. This plant gave rise to a line which is thought to be of possible practical value, the plant being characterized by low stature, extreme earliness, a ripening period 3 days earlier than Mentana, and complete freedom from rust.

The F_2 of Mentana x *Ae. ovata* was pollinated with *T. sphaerococcum*, and 3 grains were obtained giving rise to 2 plants. Almost all the progeny of the first were highly fertile and very early, whereas the second plant was semi-sterile, though 4 fertile plants appeared in its progeny.

One plant was obtained by pollinating the F_2 of Mentana x *Ae. ovata* with *T. dicoccum*; it produced 2 grains only from 59 ears; the 2 plants resulting also showed a high degree of sterility.

1613. REITZ, L. P.,
JOHNSTON, C. O. and
ANDERSON, K. L.

633.11:575.127.5:633.289

New combinations of genes in wheat x wheatgrass hybrids.

Trans. Kans. Acad. Sci. 1945-46 : 48 : 151-59.

Experiments have been carried out in Kansas on the following wheat-*Agropyron* selections from crosses made in other states and in Canada: strains of wheat x *A. elongatum*; annual strains of wheat x *A. elongatum* back-crossed to wheat; perennial progeny of the cross *Triticum durum* (Mindum) x *A. elongatum*; the amphidiploid C.I. 12348 (*Vernal Emmer* x *A. glaucum* Canadian No. S91 F); the amphidiploid C.I. 12349 (*T. turgidum* x *A. glaucum* Canadian No. S107 F); and the amphidiploid C.I. 12351 Kharkof x *A. glaucum* Canadian S147 F_3). An F_1 plant from the cross *T. dicoccum* var. *farrum* x *A. glaucum* was also studied; the seed from which it was produced originally came from the Siberian Agricultural Institute, Omsk.

The experiments indicated that grass-like perennial forms are more readily selected from wheat x *Agropyron* crosses than perennial wheat-like forms. The grassy types may show a

larger seed size. Tests also showed that a high degree of resistance to stem and leaf rust may be transferred to 28 and 42 chromosome wheats.

The collection in Kansas of wheat-*Agropyron* hybrid material is to be continued, and it is hoped to effect new crosses, further back-crossing to both *Triticum* and *Agropyron* and the re-selection of the strains already available.

1614. GIOVANNELLI, B. 633.11:575.127.5:633.289(45)
Osservazioni sui frumenti perenni russi *Triticum orientale* x *Agropyrum glaucum* e *T. lutescens* 062 x *A. gl.* e loro derivati da incroci. (**Observations on Russian perennial wheats *T. orientale* x *A. glaucum* and *T. lutescens* 062 x *A. glaucum* and their derivatives from crossing**).

Genetica Agraria, Roma 1947 : 1 : 125-29.

Observations were made on four specimens of *Triticum* x *Agropyron* hybrids of Russian origin. The first, a spring form referred to as hybrid 611, resembled an ordinary soft wheat and showed no signs of perennial habit or other *Agropyron* characters; it was of no interest from either an agricultural or breeding point of view. The second was a hybrid of *T. vulgare* x *A. elongatum* and was entirely sterile. The other two forms bore ears with ripe grains, after which a new set of ears formed from secondary tillers and then the plants died. The hybrids thus have no interest whatsoever for agricultural purposes. They have been crossed with a number of representative Italian wheat varieties and also with other wheat species and with rye. Many hybrids have been obtained from these crosses, and it is thought that some of them may ultimately lead to results of practical value.

Attempts to obtain hybrids by direct crossing of *Triticum* x *Agropyron* have not been successful, partly it is thought owing to unsuitable climatic conditions, and partly because the most appropriate species of *Agropyron* were not available.

1615. GIACANELLI, E. 633.11:577.15:581.6
Ricerche sul contenuto in catalasi di varie razze di frumenti. (**Studies on the catalase content of various wheat races**).

Genetica Agraria, Roma 1947 : 1 : 225-36.

The catalase content was estimated by measuring the volume of O₂ liberated by a given quantity of flour from hydrogen peroxide, according to Burge's method. Five of the wheat varieties bred by Strampelli were examined, and each proved to be characteristic as regards both the curve of oxygen production over a 30 hour period and the volume finally produced. The highest value was given by the variety Libero and the lowest by Roma, while Novaro, Mentana and Tevere gave intermediate values. The actual values varied according to the locality in which the grain was grown, but the relative order of the varieties remained the same.

Experimental baking tests showed that the varieties with the greatest catalase content also had the highest baking values.

1616. MARANI, M. and GOIA, G. 633.11:581.02(45)
Ricerche su alcune provenienze di frumento "Damiano Chiesa". (**Studies on certain provenances of the wheat Damiano Chiesa**).
Ital. Agric. 1941 : 78 : 780-84.

Seed of the wheat Damiano Chiesa was obtained from seven different parts of Italy and the resulting plants compared. The seed of southern provenance showed a higher germination energy but the final yield was not significantly greater, at least under the conditions in which the experiment was carried out.

1617. SANDE BAKHUYZEN, H. L. VAN DE 633.11:581.14
De ontwikkelingsgeschiedenis der tarweplant. (**The ontogeny of the wheat plant**).
Landbouwk. Tijdschr. 1943 : 55 : 533-48.

Three phases are distinguished: (1) the rosette; (2) stem elongation; and (3) ripening. The role of external factors, such as long and short day, and temperature, and the effect of

variety are exemplified. Observations relating to various well known wheats, such as Joncquois, Juliana, and Carma, are recorded.

1618. BOTTAZZI, G. B. 633.11:581.143.26.03:575.114
Esperienze di jarovizzazione del frumento. (**Experiments on vernalizing wheat**).

Genetica Agraria, Roma 1947 : 1 : 147-66.

After a brief outline of the principles and methods of vernalization and the research in Italy and elsewhere that preceded Lysenko's work, the results of the author's own experiments in 1942 are reported. Seven wheat varieties were subjected to vernalization at 2-3° C. for periods of 15, 30 and 45 days. The date of maturity was accelerated in six of the varieties and retarded in the seventh. The amount of the acceleration varied in the different varieties and in three of the varieties vernalization followed by spring sowing revealed the existence of heterogeneity within the variety, some plants coming into flower earlier than others. The following year vernalization was applied for 50 days, using 29 varieties, including the 7 used the previous year. In autumn sowings, maturity was accelerated by periods varying from 1 to 4 days in 21 varieties, and not changed in the rest. In spring sowings, some of the controls did not ear at all; the treated plants matured before the spring sown controls in most cases, though in 3 varieties there was no effect, and 2 varieties were retarded by 2-3 days. Again the treatment revealed heterogeneity in a number of varieties, the plants in the spring sowings not all maturing at the same time.

The degree to which a particular variety responded to treatment was in no way correlated with its earliness or lateness.

1619. DADSWELL, I. W. and GARDNER, J. F. 633.11:581.6
The relation of alpha-amylase and susceptible starch to diastatic activity.

Cereal Chem. 1947 : 24 : 79-99.

The flours of six varieties of white winter wheat grown at different locations were investigated in respect of their "susceptible starch" value, α -amylase content and diastatic activity. The term "susceptible starch" denotes that proportion of the starch granules which may be directly estimated by staining or indirectly by the use of β -amylase and α -amylase.

Starch susceptibility, measured by both direct and indirect methods, was found to vary significantly with variety. Location, however, was found to be a significant factor only in the cases where the starch susceptibility value was estimated on the basis of the maltose produced by β -amylase and α -amylase. The amount of α -amylase showed no relation with either location or variety. The gross diastatic activity depended upon variety and location in both natural and artificial flours. The "net diastatic activity" figures showed significant variation with regard to variety in both natural and artificial flours, but the net diastatic activity only varied significantly with location in artificial flours containing uniform amounts of α -amylase. The net diastatic activity figure is the term used to denote that portion of the maltose which is formed during the estimation of the gross diastatic activity, and which owes its origin either directly or indirectly to the presence of amylases other than β -amylase.

The analysis showed that flours having a high susceptible starch content produce a greater amount of maltose for a given level of α -amylase than those with a low susceptible starch value.

1620. JACOMETTI, G. 633.11:581.6:575(45)
Autarchia anche nella produzione di grani di forza. (**Autarchy also in the production of strong wheats**).

Ital. Agric. 1941 : 78 : 513-18.

Manitoba wheat imported from Canada and grown in Italy maintained its high quality during three successive years of multiplication but proved genetically mixed and agriculturally unsuited to the climatic conditions. Five of the best forms were isolated at the Stazione Fitotecnica per il Piemonte (Piedmont Plant Breeding Station) and then crossed

with the most successful local variety, Villaglori. The hybrids were subjected to selection in the field, and in the fifth generation 347 forms were selected after rigorous chemical and physical analysis of the flour, followed by baking tests in the laboratory; 25 forms were selected in the twelfth generation. The nineteenth generation was reached in 1941, and two of the hybrids, Nos 69 and 70, were introduced into cultivation, having been named respectively Carme Jacometti and Torino I. Both varieties combine the high quality and hardness of the Manitoba form with the early maturity, high yield and standing capacity of Villaglori when grown in the Piedmont and are being tested also in other provinces of northern Italy. Full descriptions are given of the two varieties, together with illustrations.

1621. MANUNTA, C. 633.11:581.6:575.061.6
 Analisi cromatografica e spettroscopica dei pigmenti carotenoidi delle farine e studio comparato del contenuto in pigmenti delle cariossidi di varie razze di *Triticum* coltivate in varie località. (**Chromatographic and spectroscopic analysis of the carotenoid pigments of flours and a comparative study of the pigment content of the grains of various *Triticum* races cultivated in various localities**).
 Genetica Agraria, Roma 1947 : 1 : 167-86.

Continuing the studies previously reported (cf. *Plant Breeding Abstracts* XVI, Abst. 1719), further analyses were made of the content of carotenes, xanthophyll esters, xanthophylls and carotenoids in the flour and in its different fractions, for a number of wheat varieties grown in different parts of Italy. Again the content of the different pigment groups, as well as the proportionality between them, was characteristic for the different varieties and very little affected by environmental conditions. Certain varieties contained a new pigment of the xanthophyll type, the properties of which are described; it has been provisionally named triticoxanthine.

Tables are given to facilitate the diagnosis of varieties according to the flour pigment.

1622. CIFERRI, R. 633.11-1.524(45)
 Vecchie razze locali di frumento coltivate in Italia nell'anno XVIII.
 (**Ancient local races of wheat cultivated in Italy in the year XVIII**).
 Ital. Agric. 1941 : 78 : 641-46.

The wheat yields in Italy in 1933 were 52% higher than those of 1909-1912, the change being due largely to the introduction of new varieties produced by Italian plant breeders. Tables are presented showing to what degree the new varieties have replaced the old in the different provinces; in many areas in northern and central Italy the figure is as high as 100%. In mountain areas, parts of southern Italy and in the islands, the proportion of old races still in cultivation is much higher, reaching 82% in Reggio Calabria. These ancient local races serve as an invaluable starting point from which to select the improved forms that are ultimately to take their place.

1623. LIVINGSTONE, J. E. and
 SWINBANK, J. C. 633.11-2.111-1.521.6(78.2)
Two types of late spring frost injury to winter wheat.
 J. Amer. Soc. Agron. 1947 : 39 : 536-44.

A late spring frost which occurred in Nebraska provided an opportunity of studying two types of frost injury to ten hard red winter wheats. The frost occurred just as the earlier varieties were reaching the stage of heading. In ten of the test plots situated in 11 counties scattered throughout the southern part of Nebraska, varying degrees of frost injury were observed. Partial sterility occurred in all varieties but was most severe in those nearest the stage of pollination; florets at the tip of the head were the most frequently injured. The data obtained revealed that the stage of development was a more important factor in determining the amount of sterility than varietal susceptibility to frost. In Cheyenne County, where the wheats were much later developing, only a small percentage of the florets failed to set seed. The stems, however, suffered considerable damage; all degrees of stem injury could be observed, and if the twisted or split stems continued to grow, many of the stems subsequently lodged.

1624. JOHANSSON, A. 633.11-2.111-1.521.6:575(48.5)
 Höstvetesorternas vinterhårdighet. (The winter hardiness of
 varieties of autumn wheat).
 Lantmannen 1947 : 31 : p. 509.

In comparative trials of the varieties Virtus, Eroica, Ergo, Borg and Aros in Sweden, Virtus proved the most hardy, but unfortunately has not very stiff straw, having surpassed Ergo only slightly in this respect.

Aros is a new wheat due to be put on the market next autumn. In one series of tests from 1938 to 1942 it gave a lower yield of grain than Ergo, except in one year.

1625. BECKMAN, I. 633.11-2.45-1.521.6:575.12(81)
 Os trabalhos de melhoramento em trigo na Estação Experimental de
 Bagé. (Work on the improvement of wheat at the Experimental
 Station of Bagé).
 Bol. Agron. Brasil 1945 : 9 : 45-48.

Three wheats bred at the Bagé Experimental Station are described, all of which are adapted to the climatic conditions of southern Brazil. Fronteira, from Polyssu x Alfredo Chaves, has proved superior to local wheat varieties in its high resistance to *Puccinia glumarum*. Rio Negro, from Centenario x Surpresa, is also resistant to *P. glumarum*, and is superior to Fronteira in hectolitre weight. Frontana, from Fronteira x Mentana, while having a lower hectolitre weight than Rio Negro, exceeds the latter in resistance to *P. tritici* and *Ustilago Tritici*.

1626. ATKINS, I. M.,
 HANSING, E. D. and
 BEVER, W. M. 633.11-2.451.2-1.521.6(73)
 Reaction of varieties and strains of winter wheat to loose smut.
 J. Amer. Soc. Agron. 1947 : 39 : 363-77.

Tests of the reaction of 288 soft and hard red winter wheats to artificial inoculation by loose smut [*Ustilago Tritici* (Pers.) Rostr.] were carried out during a seven-year period at the Texas, Kansas and Illinois Experiment Stations. The material studied included all the hard and soft winter wheats of commercial importance, promising unnamed hybrid selections, and many named varieties not grown commercially. The majority of the important varieties and hybrid selections were tested at two or three of the stations for several seasons.

Among the hard red winter wheats, Pawnee (Kawvale x Tenmarq) was the only commercial variety exhibiting a high degree of resistance at all three stations. A few other Kawvale x Tenmarq strains were also resistant. In Kansas, a group of unnamed selections derived from the crosses Kawvale-Marquillo x Kawvale-Tenmarq and Marquillo-Tenmarq x Kawvale-Tenmarq were highly resistant. Many of these strains are also resistant to leaf and stem rust and to Hessian fly, and thus offer a possibility of developing varieties with combined disease and insect resistance.

Unnamed strains of Kanred x Hope (C.I. 11976) and Hope x Turkey (C.I. 11964) proved leaf and stem rust resistant and showed only a low smut infection in two seasons at the Texas Station. The South American strains, Sinvalocho, Klein Triumfo and Argentina I. F. Nos. 1050 and 1053, also gave low infection readings at this station. A group of similar and partly related wheats, including Kanred, Nebraska 60, Nebred, Newturk, Tenmarq and Redit, were also highly susceptible at the Texas and Kansas Stations, but showed a low infection percentage at the Illinois Station.

Among the soft red winter wheat varieties and strains investigated, only the varieties Currell, Kawvale, Leap, Throne and Trumbull showed little or no infection at all three locations. Ashland, Austin, Forward, Flint, Gipsy, Leap Selection (C.I. 12185), Mammoth Red, Nured, Oakley, Valprize, Cornell 595 and several Mediterranean-Hope strains gave zero or low infection readings at one or more of the stations at which they were tested. The dissimilar reaction of many varieties and strains at the different stations indicates the presence of different physiological races in the inoculum used, and emphasizes the need for care in the exchange of seed between wheat-growing areas.

1627. OORT, A. J. P. 633.11-2.451.2-1.521.6:575.11
Onderzoekingen over stuifbrand. II. Overgevoeligheid van tarwe
voor stuifbrand (*Ustilago tritici*). [Investigations on loose smut.
II. Hypersensitiveness of wheat to loose smut (*U. tritici*)].
Tijdschr. PlZiekt. 1944 : 50 : 73-106.

Hypersensitiveness occurs in certain varieties of wheat after inoculation with samples of loose smut from various localities. The degree of hypersensitiveness is not the same for all varieties.

The observations and experiments made suggest that in the plant-parasite relationship the following two principles are involved: (1) the principle of susceptibility or non-susceptibility, determining whether the plant will be attacked and how seriously; and (2) an all or nothing principle of hypersensitiveness or non-hypersensitiveness, determining whether the plant will react by the phenomenon under discussion, or will show smutted ears. According to this view the relevant terminology should be (1) resistant or non-susceptible; (2) susceptible and non-hypersensitive or sensitive; and (3) susceptible and hypersensitive. For practical purposes "hypersensitive" may be replaced by "field resistance".

An attempt has been made to provide a genetic explanation of susceptibility and hypersensitivity by postulating two specific factors S_1S_1 and S_2S_2 for resistance in the plant, and two complementary factors $\Sigma_1 \Sigma_1$ and $\Sigma_2 \Sigma_2$ in the fungus which may interact with the former to produce resistance or susceptibility. Similarly, specific factors for hypersensitiveness also must be assumed in the plant and in the parasite.

1628. RUSAKOV, I. F. 633.11-2.452:576.16(47)
(The loss of rust resistance by wheat varieties in North Caucasus).
Agrobiologija (Agrobiology) 1946 : No. 2 : 52-62.

Figures are given showing that many of the varieties previously classed as rust resistant have gradually become more susceptible and that deterioration has been more rapid in areas where a variety has been grown in very extensive areas or over a number of consecutive years. The reduced resistance is ascribed to the spread of new physiological races of the parasite. Indications are given regarding the behaviour of the newer varieties; the best combination of resistance to all three rust species, stem, yellow and brown, is at present found in the varieties Novo Ukrainka and Hybrid 481, whilst resistance to yellow and brown rusts only is highest in Zernogradka and Lutescens 162, and resistance to stem and brown rust in *Erythrospermum* G-19 and G-21.

In view of the situation described, the author urges that more attention be given to the study of the rust races in different areas, and that hybridization work using resistant parents be extended and be carried out in a more representative number of areas of the U.S.S.R. than is done at the present. Even by selecting existing varieties for grain size it is possible to maintain and even increase rust resistance, since the susceptible plants produce small shrunk grain and are in this way rejected.

OATS 633.13

1629. Cereal varieties of barley and oats. 633.13:575(47)
Agricultural Chron. Moscow 1946 : No. 6 : 4-5. (Mimeographed).

Work at the Narym State Selection Station on the development of huskless oats and barley varieties giving good yields under the severe Siberian climatic conditions of the Narym region are briefly reported. Plants selected from a plot of Ukrainian oats, showing early ripening qualities and resistance to lodging, were multiplied and named Narym 614. In 1945 this new variety yielded 21.4 quintals per hectare, while the husked Golden Rain variety yielded 26.9 quintals of pure grains. Narym 614 is to be tested by the state testing station and grown on a large scale.

Huskless barleys have been secured by hybridization between huskless and husked varieties. Huskless 370/42, a six-row variety, has yielded an experimental crop of 15.8 quintals per hectare; 374/42, a two-rowed barley, has produced over 12 quintals. The varieties are described as large grained and resistant to fungous diseases. They are also to be sent to the state testing station.

1630. DOWN, E. E. and
THAYER, J. W. (JUN.)
Eaton oats.

633.13:575(77.4)

Quart. Bull. Mich. Agric. Exp. Sta. 1947 : 29 : 190-93.

The new Eaton oat variety has been developed from a cross between Bond and Logold. It has white grain, high test weight and strong straw. Eaton is resistant to the same races of stem rust as Vicland and Marion, and resembles Clinton in its resistance to crown rust. It is resistant to smut, and also to the new root rot disease (*Helminthosporium Victoriae*) which caused considerable damage in several states during 1946.

RYE 633.14

1631. YELISEYEV, N.
White rye.

633.14:575(47)

Soviet News 1947 : No. 1680 : p. 4.

A brief account is given of the breeding of the winter rye variety, Belozernaya, by Mikhailova [Mihailova] at the Novozybkov Experimental Station. The variety is described as possessing white, wheat-like grain with a protein content of 16-18%.

It was selected from a single grain of the winter rye M-4; the progeny of this grain were reared in various soils and under various methods of cultivation to ensure hardy offspring, in accordance with the principles of Lysenko.

1632. KRASNJUK, A. A.

633.14:575.125:581.162.32

(Breeding rye by the method of composite populations).

Agrobiologija (Agrobiology) 1946 : No. 2 : 44-51.

Data of various authors showing the increase in yield resulting from cross-pollination between rye varieties are cited. In 1940 plots of 6.1 sq. m. were sown with 10 rye varieties, each variety being sown with stock seed obtained from the breeding station and with seed obtained by open pollination in small plots surrounded by a collection of varieties. In every case the plant from open-pollinated seed gave higher yields, the differences varying from 1 to 96%. A system of seed production is described in which each generation is subjected to open pollination in this way, the progress of individual plants being examined and part of the seed from the yield of the best progenies returned to the nursery for further repeated selection while the remainder is bulked to serve as the starting point for a new variety. This method is considered more effective than the strain building and analogous methods used in other countries, as it utilizes the capacity for selective fertilization of the gametes.

Data are presented showing that the new rye variety, Volžanka, produced by the method described, yielded 10.1% more than the variety Saratov No. 1 and 7% more than Saratov No. 8, in tests over three consecutive years on the experimental plots of the Saratov institute; in the state variety tests it yielded from 1.6 to 5.5% more than Saratov No. 1 in different zones.

1633. LUNDQVIST, A.

633.14:581.162.5:575.14

On self-sterility and inbreeding effect in tetraploid rye.

Hereditas, Lund 1947 : 33 : 570-71. (Abst.).

Both diploid and tetraploid strains of the variety Stål (Steel) show signs of degeneration after inbreeding, though the effect is less marked in the tetraploids. The inbred tetraploid strains are as self-sterile as the original diploids, but incompatibility is less pronounced.

- 1634.

633.14-2.6-1.521.6:575.42(49.2)

SEINHORST, J. W.

633.14-2.6-1.521.6:578.08

Een laboratoriummethode voor de bepaling van de vatbaarheid van rogge voor aantasting door het stengelaaftje [*Ditylenchus dipsaci* (Kühn) Filipjev]. [A laboratory method for determining the degree of susceptibility of rye to infestation by the stem eelworm (*D. dipsaci* [Kühn] Filipjev)].

Tijdschr. PlZiekt. 1945 : 51 : 39-52.

In continuation of research by various predecessors, Wellensiek has since 1943 included in his rye breeding programme the production of a stem eelworm resistant variety combining

the high qualities of Petkus with the resistance of strains of the indigenous Ottersumse and Pulder ryes. Constant observations to eliminate susceptible plants are being carried out by the author of the present paper, which is devoted largely to a full discussion of methods of infection. Clones were tested by inoculation of young tillers. Symptoms were obtainable throughout the years except during July and the latter two weeks of August.

Susceptible and resistant plants could be clearly distinguished both as seedlings and as older plants.

MAIZE 633.15

1635. ZAPPAROLI, T. V. 633.15:575(45)
 Il granoturco Precoce di Bagnolo. (**The maize Bagnolo Early**).
 Ital. Agric. 1941 : 78 : 579-83.

The variety in question is a mass selection made at the Bagnolo farm in the Montemurlo district near Florence. The original form was characterized by extreme hardiness, resistance to drought and other unfavourable conditions, and high yielding ability etc.; selection was carried out over a number of successive generations for early maturity, short stature and numerous ears. From the selected material, average yields of as much as 98 centners per ha. fresh weight have been obtained in dense sowings, and since it often ripens in the first week in August, before all other varieties in the locality, the product commands exceptionally high prices. It bears up to 5 ears per plant, with an average of 1-2, with bright yellow grains of average size and a very reduced rachis.

1636. 633.15:575(77.7)
Report on agricultural research for the year ending June 30, 1946.
 Rep. Ia Agric. Exp. Sta. 1946 : Pt II : Pp. 70.

Maize

Several new early hybrids have been released.

Tests of resistance to smut (*Ustilago Zeae*) again suggested that Mexican and Guatemalan maize is more resistant than the varieties of the Corn Belt.

Native and exotic maize varieties were tested for resistance to *Pythium graminicola*. Resistant material is being increased at the Tropical Research Centre, Guatemala, for further testing.

Single and double crosses were tested for resistance to the European borer, on the basis of stalk breakage. Resistance to stalk breaking in the absence of borers and resistance to stalk breaking in the presence of borers proved to be positively correlated.

Investigations on the location of the gene gl_3 for glossy seedling on chromosome 3 have revealed the linear series $Ps-Pr-gl_3$.

Work on the evaluation of the early testing procedure was continued.

The problem of the linkage barrier to the production of improved inbred lines is discussed. It is stated that parental combination of genes reaches a limiting value soon after two generations of inbreeding only; thereafter the power of selection is markedly reduced. A general formula has been derived as follows, giving the limiting value to the so-called "freeze" due to action of linkage in inbreeding:

$$r_n = r - s \left[\frac{(r-s)s}{2-(r-s)} \right],$$

where r = percentage of parental gametes, and s = percentage of non-parental gametes. A table is provided giving the limiting values in the case of different crossing-over values. The following formulae for determining the gametic ratios with successive generations of self-fertilization are also given:—

$$\begin{aligned} r_1 &= 2(r_1 + s_1)r_{i-1} - (r_1 - s_1)^{i-1} \\ s_1 &= 2(r_1 + s_1)s_{i-1} + (r_1 + s_1)^{i-1} \end{aligned}$$

where r_1 = original parental gametes, s_1 = non-parental gametes (in ratios of whole numbers), and i = generation of selfing. In practical breeding, the linkage barrier necessitates early recurrent selection on as large a scale as possible for desirable gene combinations, including those genes conditioning combining ability.

The results of comparative investigations on the stem and root development of inbreds and single crosses confirm those of previous years (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 187). In addition the data show that the hybrids and inbreds grown in Iowa are far from being adapted to the seasonal conditions under which they are grown. The seasonal conditions prevailing at the usual time of planting in May and during the first few weeks of growth apparently prolong the formative period, and thus have a considerable stunting effect upon the size and functioning of the plant throughout its growth period. The formative period is defined as the number of days from the date of planting to the appearance of the tassel primordia.

Histological experiments have shown that the pattern of starch distribution in the endosperm is largely determined by the female parent. In the cross popcorn x dent maize, however, the pattern of starch distribution was slightly modified in the direction of the dent type.

Investigations on genetic variation in protein, carbohydrate and oil content were continued. In the analysis of samples of dent maize for alcohol soluble protein or zein, a linear relationship between zein and total protein was noted. The endosperm of sweet corn contained an average of 1% less zein than dent corn of equal protein content. Studies of the mode of inheritance and interrelationships of total protein, zein, tryptophane and lysine are in progress.

Genetic types are now available having 0, 3, 28, 45 and 60% of amylose. Strains with 45 and 60% amylose have been obtained by the use of the recessive character "dull" (*du*). Attempts to transfer this character to dent maize have been only partially successful. In so far as high amylose percentage is concerned, the gene *du* appears to be a specific modifier of the gene *su* for sugary endosperm; in dent maize, *du* appears to have no appreciable effect on amylose percentage. The different genotypes *su* (sweet), *bt* (brittle) and *Su Bt* (dent) exhibit marked differences in the relative amounts of stored carbohydrate reserves. The inheritance of oil content was studied in several hybrids. No consistent dominance of either low or high contents was found. In all cases, however, germ size and oil content were closely associated.

Sweet corn

Promising new single hybrids have been developed, including Country Gentleman hybrids. The Country Gentleman inbreds 2508 and 2730 were released for the production of Golden Iogent Hybrid.

Popcorn

The production of hybrids of white hull-less types and the yellow pearl type is in progress.

1637.

633.15:575.12

O milho híbrido nos E.U.A. (**Hybrid maize in the U.S.A.**).

Bol. Agron. Brasil 1945 : 9 : 32-34.

A summary in Portuguese is given of an article by Ahlgreen on the technique of producing hybrid maize and on the advantages to be gained by so doing.

1638.

RICHEY, F. D.

633.15:575.12(73)

Corn breeding: gamete selection, the *oenothera* method, and related miscellany.

J. Amer. Soc. Agron. 1947 : 39 : 403-11.

The author discusses the technique of "gamete selection" (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 986) and of the *Oenothera* method (cf. Abst. 191) recently proposed by Stadler and Burnham, respectively.

1639.

TEIXEIRA, E. F.

633.15:575.12(81)

Milho híbrido. (**Hybrid maize**).

Bol. Agron. Brazil 1946 : 10 : 170-73.

A general account is given of the advantages entailed by producing maize hybrids. In the state of São Paulo, hybrid maize production is centred at Campinas and Piracicaba. The hybrid Pelotas-Santa Rosa, produced at Piracicaba, is mentioned as especially promising.

1640. HULL, F. H.

633.15:575.125:575.42

Cryptic homozygous lines.

J. Amer. Soc. Agron. 1947 : 39 : 438-39.

In a previous paper (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 996), the author proposed a method of developing higher yielding maize hybrids. It was suggested that an established single cross should be used as a tester seed parent in the production of commercial hybrids. In order to determine the highest yielding commercial combination, open-pollinated plants derived from two homozygous lines should be selfed and at the same time crossed individually on to the single cross tester. It is explained that each open-pollinated plant selfed and test crossed is essentially the F_1 of the cross of two "cryptic homozygous lines", so that the crosses with the tester are genetically equivalent to double crosses. In any three-year cycle, it is in effect possible to produce an entirely new series of homozygous lines, combine them first into single crosses, to combine these singles with an established tester single cross to produce double crosses, test these double hybrids, and recombine the selected single crosses.

This method makes it possible to substitute an improved pollen single cross at the end of each cycle of breeding, to be used with the same seed single cross.

In the previous paper it was proposed to use as the pollen parent in breeding the commercial "double hybrid", the recombination at the end of any three-year cycle, or inbreds derived from it and from the group of selected one-year selfs. An alternative method is to use advanced generations of just one of the selected one-year selfs, i.e. essentially the advanced generations of the single cross of two homozygous lines. By this technique the commercial "double cross" may be slightly more uniform than those now used.

Additional data have been received by the author since the publication of his paper on overdominance and its effect upon yield (cf. Abst. 691). These support the conclusion that the higher yielding inbred lines are valueless as testers for general combining ability (cf. also *Plant Breeding Abstracts*, Vol. XVI, Abst. 1242).

1641. CELESTRE, M. R.

633.15:575.243:581.037

Ricerche citologiche e genetiche su un granturco nano elettrogenito.
(Cytogenetic and genetic researches on dwarf maize produced electrogenetically).

Genetica Agraria, Roma 1947 : 1 : 204-17.

Dwarf plants were produced by the application of an alternating magnetic field to the female inflorescence of the maize variety Mokant, which had been grown for sixteen generations without showing signs of mutation. The treatment was applied eight days before the emergence of the silk, and the flowers were pollinated with pollen from the same plant, after which they were bagged. The first generation after treatment with the current at 45 periods contained 37% of dwarfs. No chromosome irregularities were observed in the dwarf plants either in root tips or during microsporogenesis. Some of the plants were sterile and some bore grains deviating from the typical violet coloration of the original form. The rachis was often pigmented, though there was no correlation between the colour of the rachis and the grain colour.

The dwarf character bred true in the F_2 and later generations; all the plants produced from the dwarf seeds also bore yellow seeds. The height of the dwarf plants varies from 20 cm. to 45 cm., and they are characterized by excessive branching at the base; the ramifications of the male inflorescence on the other hand are much reduced and the inflorescence may even be simple. A wide range of sexual deviations was observed on the dwarf plants, and the majority of the plants were andromonoecious.

The dwarf character behaved as a simple recessive in crosses with Australian Gold Dent; it corresponds in all respects to Emerson's dwarf, but this is thought to be the first time it has been produced in quantity by artificial means.

1642. MANGELSDORF, P. C.

633.15:576.16

The origin and evolution of maize.

Advances Genet., N.Y. 1947 : 1 : 161-207.

The problem of the origin of maize is discussed with reference to the literature and investigations by the author.

1643. WANG, F. H. 633.15:581.48:575.125
Embryological development of inbred and hybrid *Zea mays* L.
 Amer. J. Bot. 1947 : 34 : 113-25.

The development of the embryo and endosperm has been studied in the inbred maize lines, 38-11, WF9 and K-64, and in their hybrids. Heterosis in the hybrids was manifested as an increased growth rate of the embryo and endosperm in comparison to the inbreds during the early stages of development of the grain. The increased growth rate tended to disappear as the grain matured.

1644. FENNELL, J. L. 633.15-2.7-1.521.6:575(72.86)
 Milho resistente ao gusano da raiz. (**Maize resistant to rootworm**).
 Bol. Agron. Brazil 1946 : 10 : 156-57.

Maize varieties resistant to *Diobrotica* spp. have been obtained from the mountainous region of Chirripó, Costa Rica; one of these, Chirripó 1, is outstandingly resistant. Plans have been made to cross these forms with high yielding commercial varieties.

1645. HUTCHCROFT, C. D.,
 ROBINSON, J. L. and
 REISS, F. 633.15.00.14:575.12(77.7)
The 1946 Iowa corn yield test.
 Bull. Ia Agric. Exp. Sta. 1947 : No. P 84 : 752-804.

The results of the 1946 tests of maize hybrids in various regions of Iowa are summarized. Data are presented on yield, stand, percentage moisture content, resistance to lodging, height of ear, and percentage of dropped ears.

BARLEY 633.16

1646. ROBERTSON, D. W.
 WIEBE, G. A. and
 SHANDS, R. G. 633.16:575.11
A summary of linkage studies in barley : Supplement I, 1940-1946.
 J. Amer. Soc. Agron. 1947 : 39 : 464-73.

The results of genetical investigations published during the period 1940-46 on characters in barley are summarized. Tables list (1) the characters studied by the various workers, (2) the characters which have been studied in investigations as yet unpublished, (3) linked and associated characters, (4) factors showing independent inheritance, and (5) barley strains with a chromosome number greater or smaller than the normal diploid number of $2n = 14$. The tables include recommended and previously used symbols, and literature citations. Earlier genetical investigations have been previously summarized (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 708).

1647. PARKER, J. H. 633.16:575.12
Hybrid or crossbred barley.
 Brewers Digest 1946 : 21 : No. 12 : 51-57.

A general account is given of the technique of hybridization in barley, experiments on the extent of natural crossing, the development of the spike, classification of the cultivated barleys, chromosome numbers in the genus *Hordeum*, linkage groups in barley, quantitative inheritance, breeding smooth-awned varieties, and malting tests on hybrid selections. The article is illustrated by excellent photographs of spikelet groups, florets, and the development of spike.

1648. GUSTAFSSON, Å. 633.16:575.125
 633.16:575.41:575.113.7
The advantageous effect of deleterious mutations.
 Hereditas, Lund 1947 : 33 : 573-75. (Abst.).

Plants of Golden barley heterozygous for each of the lethal mutants *albina* 7 and *xantha* 3,

have 19% more spikes than the normal variety, 18% more kernels, and a 15% higher kernel weight.

1649.

WOODWARD, R. W.

633.16:581.46:575.113.3

633.16:581.46:575.116.1.061.6

The I^h , I , i alleles in *Hordeum deficiens* genotypes of barley.

J. Amer. Soc. Agron. 1947 : 39 : 474-82.

A study was made of the I^h , I and i factors in *H. deficiens*, which affect the development and fertility of the lateral florets in barley, and which are located in linkage group 4.

The V^t , V and v alleles for the *deficiens*, two-rowed and six-rowed conditions, respectively, are known to be located in linkage group 1. The gene V^t for the *deficiens* character is epistatic to the alleles I^h , I and i . Genotypes of the constitution vv are six-rowed barleys, irrespective of the presence of I^h , I or i . Varieties of *H. distichon* have been previously analysed as being of the genotype $VVii$ or VVI^hI^h .

In order to study the behaviour of the I^h , I and i factors in *H. deficiens* and the inheritance of the *deficiens* character, five strains of this species were crossed with the two-rowed Svanhals barley having the genotype $VVii$. The strains included White *Deficiens* (C.I. 7316), C.I. 3949, C.I. 3951-2, C.I. 7140, and Black *Deficiens* (B_1 - C_1). Analyses of the F_2 and F_3 generations showed that the genotype of White *Deficiens* is probably V^tV^tii , and that of Black *Deficiens* V^tV^tII . C.I. 3951-2 and C.I. 7140 were found to possess the probable genotype $V^tV^tI^hI^h$, while the results suggested that C.I. 3949 included genotypes of V^tV^tII , and $V^tV^tI^hI^h$ or $V^tV^tI^hI$.

The factor V^t is partially dominant to V and v . The F_2 generation could be classified into the following phenotypes and genotypes: *deficiens* type, V^tV^t ; heterozygotes resembling a weak two-rowed type, V^tV ; two-rowed forms, $VVii$; segregating two-rowed barleys and intermedium types, $VVii$; and intermedium forms, $VVII$ or VVI^hI^h .

The various intermedium types showed considerable variation in the fertility of the lateral florets. Different plants of the same progeny and different heads of a single plant also exhibited marked variation. In addition, it was noted that these forms varied in their response to soil fertility, spacing and other factors influencing growth.

The factor pair $Pr\ pr$ for purple colour versus white colour in the glumes, and the factor pair V^tV for the *deficiens* character versus the non-*deficiens* character, were found to be linked with a cross-over value of 14.1 ± 0.36 for the F_2 and F_3 of all the combinations studied.

1650.

633.16:581.6(73)

Industrial evaluation of Bay barley a new variety released in Michigan.

Publ. Malt Res. Inst. Madison, Wisconsin 1946 (1947) : No. 5 : Pp. 22.

A report is given of commercial malting and brewing tests of the new Bay barley variety (cf. Abst. 199) in comparison with Wisconsin Barbliss.

1651.

POEHLMAN, J. M.

633.16-2.451.2-1.521.6:575(73)

Sources of resistance to loose smut, *Ustilago nuda*, in winter barleys.

J. Amer. Soc. Agron. 1947 : 39 : 430-37.

During a four-year period, artificial inoculation tests were made on 65 winter barleys of different types for their resistance to *Ustilago nuda* (Jens.) Rostr. Of the awned varieties investigated, only Kentucky 6 and Bulgarian were rated as resistant, i.e. as showing 5% or less infection. These varieties were tested only in two out of four years. Among the 23 hooded varieties and selections, 17 were found to be resistant. This resistance was derived from either Tennessee Beardless or Missouri Early Beardless. It is suggested that the extensively tested Iredell and North Carolina 26 types should be useful as parents in breeding winter barley for the northern area. Selections from Missouri Early Beardless also appear to be valuable. At the Missouri Experiment Station, selections of Missouri Early Beardless have already been used in hybridization. These crosses show promise of possessing resistance to both loose smut and mildew, and a winter hardiness approaching that of Reno.

1652.

POPOV, G. I.

633.171-1.962.4:575.125

633.171:575.14

(The importance of diversity in millet.)

Agrobiologija (Agrobiology) 1946 : No. 2 : 28-43.

Although millet is, according to most authors, mainly self-pollinated, at least 10% of cross-pollination customarily occurs. Plants deviating in type from the majority were found in a number of standard varieties and measurements of such characters as plant height, tillering, length of panicle and grain yield showed most of them to be superior to the best of the plants conforming more closely to the varietal type. A number of the deviating types are illustrated and described. Many of them had cream coloured grains as opposed to the pink of the original variety. The yield of grain from 25 typical plants sown from the 1943 harvest was 178 grm. and that from 25 deviating plants 310 grm. Similarly 26 typical plants sown from the 1942 harvest yielded 286 grm., as against 483 grm. from 26 deviating plants, all with cream coloured grain; certain other plants deviating in other characters gave similar increases in yield. The progeny of many of the deviating plants resembled the maternal plant in almost all respects except grain colour, which varied from cream to red, with many intermediates.

In addition to the plants deviating in desirable directions, a certain number of dwarf and other inferior types were discovered, especially in the older varieties. Old land varieties on the other hand proved very uniform and generally superior to the selected varieties in yield. The conclusion is reached that such varieties, comprising as they do mixed populations of forms all conforming to one general type, constitute the optimum combinations of genetic heterogeneity and uniformity and that attempts to attain greater genetic homogeneity lead to loss of vigour. This is regarded as the main reason for the constant change in the varieties considered the best. An examination of the records since 1932 shows a succession of varieties, each retaining pride of place for a year or two only.

1653.

633.174(73)

10 years of better sorghums.

Sth. Seedsman 1947 : 10 : No. 4 : 28, 32-33, 36.

The following sorghum varieties are described: Plainsman, Caprock, Martin, Westland, Midland, Dalhart, Wheatland, Double Dwarf White Sooner Milo, Double Dwarf Yellow Sooner Milo, Milo 7088, Early Hegari, Bonita, and Sweet Sudan.

1654.

633.174(76.4)

Texas drylands are tailor-made to hold bulk of nation's grain sorghum acreage.

Sth. Seedsman 1947 : 10 : No. 4 : 15, 58-62.

In a brief account of sorghum production in Texas, attention is drawn to the Martin Combine Milo variety, introduced in 1941, and the chief variety now cultivated in South Texas. The variety shows outstanding ability to give high yields under extremely unfavourable weather conditions.

1655.

633.174:575(73)

Midland, new grain sorghum for upper South likes pre-harvest frost for best threshing.

Sth. Seedsman 1947 : 10 : No. 3 : p. 46.

An account is given of the Midland grain sorghum (Kansas 617), recently developed at the Kansas Agricultural Experiment Station from a cross between Pink Kafir and Dwarf Yellow Milo. The variety shows most usefulness in districts where there is a likelihood of frost before harvest, since it possesses a stiff juicy peduncle that holds the head erect; it threshes more readily after a frost. Midland is high-yielding, with medium sized, reddish yellow grain; it is resistant to *Pythium* milo disease, "weak-neck", and shattering; and if planted early it is tolerant to chinch-bug attack.

1656.

633.174:575(76.4)

ALTHAUS, W. G.

"60-day" milos!

Sth. Seedsman 1947 : 10 : No. 4 : p. 13.

An account is given of two new varieties of grain sorghum developed in Texas. They have been selected from a cross between Early White milo and Double Dwarf Yellow milo, and

are known as Double Dwarf Sooner milos, one variety being yellow-seeded and the other white-seeded. The new varieties possess early maturity, suitability for combine harvesting, and grain with good starch properties. They are adapted to late planting, thus providing the chance of a crop in years when early plantings of other crops fail; by late planting these varieties should also escape charcoal rot infection.

1657. CIFERRI, R. 633.174-1.524(67)
 La cerealicoltura in Africa Orientale. III—Generalità botanico-agrarie
 sui sorghi. (**Cereal cultivation in East Africa. III—Botanico-
 agrarian discussions concerning the sorghums**).
 Ital. Agric. 1941 : 78 : 79-86.

After some discussion of the problem of the systematics of the sorghum species, a brief account is given of the botanical composition of the sorghums cultivated in Italian East Africa.

1658. SKARIEN, K. 633.174-1.524(73)
Sorghum history : saga of the giants and dwarfs.
 Sth. Seedsman 1947 : 10 : No. 4 : 20, 64.

Historical information is given on the introduction of sorghum varieties in the United States.

RICE 633.18

1659. O arroz no Brasil. (**Rice in Brazil**). 633.18(81)
 Bol. Minist. Agric., Rio de J. 1943 : 32 : No. 11 : 138-39.

A short account is given of the rice varieties grown in different parts of Brazil.

FORAGE GRASSES 633.2

1660. ATWOOD, S. S. 633.2/3:576.3:575
Cytogenetics and breeding of forage crops.
 Advances Genet., N.Y. 1947 : 1 : 1-67.

A comprehensive review is given of investigations on the cytogenetics and breeding of *Poa* spp., *Phleum pratense*, *Dactylis glomerata*, *Bromus* spp., *Lolium* spp., *Festuca* spp., Sudan grass, various grasses in the southern United States, prairie grasses, and other miscellaneous grasses, lucerne, red, white and sweet clovers, and miscellaneous legumes. This useful review contains 350 references.

1661. 633.2:575(73)
 633.3:575(73)

**Tenth annual report of Pasture Research in the Northeastern
 United States State College, Pennsylvania 1946 : Pp. 75. (Mimeo-
 graphed).**

The tenth annual report of pasture research in the north-eastern United States refers to breeding and cytogenetical investigations on *Dactylis glomerata*, *D. Aschersoniana*, *Bromus inermis*, *Poa pratensis*, *Phleum pratense*, *Medicago sativa*, *Trifolium repens*, *T. pratense* and other species.

1662. MATTHEWS, A. C. 633.2:581.142:578.08(75.6)
**Observations on methods of increasing the germination of
Panicum anceps Michx. and *Paspalum notatum* Flüggé.**
 J. Amer. Soc. Agron. 1947 : 39 : 439-42.

Methods of improving the seed germination of *Panicum anceps*, *Paspalum notatum* and other species of *Paspalum* are described.

1663. JONES, M. D. and 633.2:581.162.3(78.2)
 NEWELL, L. C.
**Pollination cycles and pollen dispersal in relation to grass
 improvement.**

Res. Bull. Neb. Agric. Exp. Sta. 1946 : No. 148 : Pp. 42.

A report is given of investigations on the time of day and the number of days of blooming and pollen shedding in a large number of grasses. The distances of pollen dispersal in

amounts sufficient to cause contamination in seed fields were also studied in the following seven species: brome grass (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*), buffalo grass (*Buchloe dactyloides*), switchgrass (*Panicum virgatum*), maize and rye.

1664. LINDBERG, H. 633.2:582(56.4)
Iter cyprium. Contributio ad cognitionem floræ insulæ Cypri. (**Cyprian journey. A contribution to the knowledge of the flora of the Island of Cyprus**).

Acta Soc. Sci. Fenn., Helsingfors 1946 : 2 : No. 7 : Pp. 37.

Descriptions and plates are included of three new Cyprian grasses: *Brachypodium firmifolium*, *Agrostis cypricola* and *Poa Sintenisii*.

1665. CAMUS, A. 633.2:582(69.1)
Graminées nouvelles de Madagascar. (**New Gramineae from Madagascar**).

Bull. Soc. Bot. Fr. 1945 : 92 : 50-53.

Four new species are described: *Panicum ankarensense*, *P. vohitrense*, *Digitaria Lemeeana* and *Poecilostachys Gougerotiana*.

1666. DE VRIES, D. M. and KRUIJNE, A. A. 633.2:582:578.088
Onderscheiding der grassen van ons hooi- en weiland volgens kenmerken der niet bloeiende spruiten. (**How to distinguish the grasses of our hay and pasture lands by characteristics of the non-flowering shoots**).

Meded. LandbvoorlichtDienst, Wageningen 1946 : No. 43 : Pp. 55.

The Dutch Agricultural Instruction Service has issued this guide for the identification of 41 of the common grasses by leaf characteristics only. It contains a list of leaf characters with observations on their importance in identification; a diagnostic table and illustrated descriptions of the 41 species, alphabetically arranged; and a table of the Latin names and one containing Dutch and Frisian names. In the descriptive portion, the English, French, American and German equivalents are given in many cases with the Dutch and Frisian names.

1667. ALBRECHT, H. E. 633.23-1.521.6:581.04
Strain differences in tolerance to 2,4-D in creeping bent grasses.
J. Amer. Soc. Agron. 1947 : 39 : 163-65.

Creeping bent grass strains have shown considerable differences in response to the toxic effect of the herbicide 2,4-D.

1668. CUGNAC, A. DE 633.262:581.46:576.12
Recherches phylétiques sur le genre *Bromus*. XIII. L'appendice de l'ovaire et du grain chez les *Bromes* et quelques genres voisins. A propos d'un dessin de l'"Histoire des Plantes" de Baillon. (**Phyletic researches on the genus *Bromus*. XIII. The appendage on the ovary and grain in the species of *Bromus* and some neighbouring genera. In connexion with an illustration in Baillon's *History of Plants***).

Bull. Soc. Bot. Fr. 1945 : 92 : 216-22.

Figures and descriptions are given of the terminal appendage on the ovaries of *Bromus* species. The stigmas are born subterminally at its base. These structures were figured by Baillon, though the species concerned were erroneously identified. Traces of a comparable arrangement occur in *Festuca*, *Lolium* and *Lepturus*.

1669. BAILEY, R. Y. 633.266-2.111-1.521.6(73)
The narrow-leaf Bahia grasses.

Soil Conservation, Washington D.C. 1946 : 11 : 227-30.

The value of the two narrow leaved strains of Bahia grass (*Paspalum notatum*) Pensacola and Wilmington, is discussed (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 785). The Pensacola strain is less winter hardy than the Wilmington strain; trials have indicated that the

former shows promise as a pasture grass for the lower South of the United States, while the latter should be valuable for the middle South. The Pensacola strain was collected in Florida, the Wilmington strain in North Carolina. The northern limits of the area in which Pensacola gives a satisfactory performance are indicated.

1670. CORNELIUS, D. R. 633.282:576.16(73)
The effect of source of little bluestem grass seed on growth, adaptation, and use in revegetation seedings.
 J. Agric. Res. 1947 : 74 : 133-43.

Observations are given on the characteristics of different ecotypes of *Andropogon scoparius*.

1671. FARIA, A. LIMA DE 633.284:581.331.2:576.356
Disturbance in microspore cytology of *Anthoxanthum*.
 Hereditas, Lund 1947 : 33 : 539-51.

Unorientated nuclear divisions have been found in the pollen grains of plants of *A. aristatum* Boiss. carrying supernumerary B. chromosomes. In some cases, a further mitotic division of both the generative and vegetative nuclei occurred. Small masses of chromatin appeared in the cytoplasm of some pollen grains, especially in those with single nuclei.

1672. STOMPS, T. J. 633.285:575.12:576.356.5
 Het *Ammophila baltica*-problem. (The *A. baltica* problem).
 Vakbl. Biol. 1943 : 24 : 81-82.

The hybridity and genetic origin of the sand binding species *A. baltica* Link are discussed with reference to the diploid and triploid types already discovered by Westergaard and the tetraploid hybrid which has not yet been found.

Attempts to synthesize *A. baltica* var. *subarenaria* by hybridization have not been successful, though *A. baltica* var. *intermedia* and var. *epigeioidea* have been thus obtained.

The ecology of these three hybrid types is different.

The significance of the *A. baltica* problem for Holland and the importance of cytology as a tool in systematics are pointed out.

1673. JENKINS, T. A. 633.289:575.42(76.4)
K-R is a better grass.
 Sth. Seedsman 1947 : 10 : No. 6 : p. 18.

The King Ranch strain of yellow bluestem (*Agropyron Smithii* Rydb.) is giving valuable results in Texas and Oklahoma. It shows improvements over ordinary yellow bluestem in the readiness with which it becomes established, its growth, nutritive value, cold resistance, suitability of the seed for harvesting, re-seeding capacity under adverse conditions, and its value in soil conservation. King Ranch yellow bluestem was developed from a superior strain found growing in southern Texas; its origin is unknown.

LEGUMINOUS FORAGE PLANTS 633.3

1674. CRANDALL, B. H. and
 TATE, H. D. 633.31:581.162.32(78.2)
The bee, *Calliopsis andreniformis*, as a factor in alfalfa seed setting.
 J. Amer. Soc. Agron. 1947 : 39 : 161-63.

The role of the bee, *C. andreniformis*, in pollinating lucerne in Nebraska is described.

1675. JONES, F. R. and
 SMITH, W. K. 633.31-2.3-1.521.6:575(73)
Segregation of resistance to bacterial wilt in crosses involving Grimm alfalfa.
 J. Amer. Soc. Agron. 1947 : 39 : 423-25.

The complete range of reaction to bacterial wilt among segregates from crosses between the susceptible Grimm lucerne and highly resistant forms has been analysed on the basis of type of reaction. Wilt immune plants were isolated in the F_1 of such crosses, indicating the possibility of introducing wilt resistance into Grimm.

1676.

WILSON, J. K.

633.32:576.6

634.97:576.6

Variation in seed as shown by symbiosis.

Mem. Cornell Agric. Exp. Sta. 1946 : No. 272 : Pp. 21.

Variation was shown by the seedling progeny of different plants within each of the following species in their symbiotic relationships with various isolates of legume bacteria: *Robinia Pseudo-acacia* L., *Trifolium hybridum* L., *T. pratense* L., and *Sesbania exaltata* (Ref.) Cory.

1677.

633.32-2.111-1.521.6(47.1)

633.321.00.14(47.1)

633.323.00.14(47.1)

SALOHEIMO, L.

Om klöverodling på torvjord samt resultat från försöken med olika klöverstammar på Finska Mosskulturföreningens Karelska försöksstation under åren 1928-1938. (**On clover growing on peat soil with results from experiments with different clover strains at the Finnish Experimental Station in Karelia for the Reclamation of Bogland during 1928-38).**

Finska MosskFören. Årsb. 1939 : 43 : 94-107.

The development of the study and improvement of indigenous and other clover strains in Finland is described. The actual breeding operations are now conducted by the Government Agricultural Research Institute and by the Central Co-operative Hankkija Plant Breeding Institute at Tammisto.

Five trials with clover strains on bogland were laid down at the Karelian Experiment Station of the Finnish Society for the Reclamation of Bogland at Tohmajärvi; nearly all were Finnish strains, red clover and alsike. All stood the winter well, the red clovers Kivinen and Soikkeli being best in that respect. Suoninen and Helpiö gave the best yields of fodder, averaging 74.5 and 73.7 double centners per ha. for the years 1929 and 1930.

In another trial begun in 1934, Piikis alsike proved more winter hardy than its foreign competitors, of which Kurland clover gave the highest yields. Of the red clovers, Tammisto I was the most winter hardy and Ekerö the highest yielding.

Trials started in 1937 showed that Tammisto was the most winter hardy red clover, and Øtofte the most cold resistant alsike.

It was clear that, within each species, the yields were directly correlated with their overwintering capacity.

1678. HOLLOWELL, E. A.

633.327(73)

Crimson clover.

Leaf. U.S. Dep. Agric. 1947 : No. 160 : Pp. 8.

This bulletin, dealing with the cultivation of crimson clover (*Trifolium incarnatum*) in the United States, includes information on the new hard-seeded Dixie variety (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 613).

1679. COUTINHO, L. A.

633.35:576.312.34

Novos subsídios para a cariólogia do género *Vicia* L. (**New contributions to the cariology of the genus *Vicia* L.**)

Bol. Soc. Broteriana 1945 : 19 : 449-55.

Diagrams are presented of the metaphase chromosomes of *V. sativa* L., *V. grandiflora* Scop., *V. canadensis* Zuccagni, *V. ambigua* Guss., *V. striata* Bieb., *V. ferruginea* Bess. and *V. Michauxii* Spreng. The last six species all resemble *V. sativa* in the number ($2n = 12$) and morphology of their chromosomes.

ROOTS AND TUBERS 633.4

1680.

633.41:581.192:578.08(49.2)

JANSE, L. C.

633.63:581.192:578.08(49.2)

Droge stof en refractie van voerbieten en suikerbieten in 1941. (**Dry matter and refractive index of fodder beets and sugar beets in 1941).**

Landbouwk. Tijdschr. Wageningen 1942 : 54 : 796-97.

As a rapid method of estimating the value of fodder and sugar beets, the refractive index of

the expressed juice may be taken as a basis for determining the soluble dry matter, and also, it is here claimed, the total dry matter.

The method should be of value in hastening breeding operations.

1681.

633.491:575(43.7)

Original varieties of potatoes.

Sativa, Havlíčkův Brod 1947 : Pp. 40.

Notes are presented on 15 potato varieties developed at the Sativa Institute at Keřkov, situated in the hilly country between Bohemia and Moravia. The publication is well-illustrated with photographs.

1682.

MONTALDO, A.

633.491:581.143.26(38)

Observaciones sobre el período de reposo de la papa. (Observations on the dormancy period of the potato).

Agric. Tec. Chile 1946 : 6 : 93-108.

The degree of sprouting, vigour of the shoots, tuber consistency, rate of development in the field and number of lenticels per unit area of tuber have been ascertained for 144 varieties of *Solanum tuberosum* L., including local varieties from Chiloé, Rio Negro, Magallanes, Africa, P. Varas, Llanquihue, Rio Bueno, Puente Alto and Centinela, introduced varieties from abroad, and seedling selections.

Outstanding resistance to premature sprouting was found in Record, 627-126, Cebolla, Caribaja, Huacalajra, Pedán, Calichagua, Nostra Zapatona, 205,226, C14-1 and C14-2. No significant correlations could be established between dormancy period and tuber consistency, dormancy period and rate of development in the field, or number of lenticels and tuber consistency.

1683.

NOZZOLINI, V.

633.491:581.143.26.03(45)

Il problema delle patate da seme. (The problem of seed potatoes).

Genetica Agraria, Roma 1947 : 1 : 276-84.

In continuation of the work previously reported (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1663), results from the 1946 experiments confirm that potatoes sown in northern Italy in July after a wheat crop gave higher yields than those sown in spring.

In the spring of 1946 it was found that tubers from summer planting in 1945 gave a healthier crop than those from the spring planting; over half the plants of the latter group died. The yield from 50 plants was 17.8 kg. from those from summer planting, and only 9.2kg. from those from spring planting, and the size and quality of the tubers was also superior in the former, in spite of the fact that the 50 remaining plants from the spring plants seed occupied twice the area.

1684.

LECLERG, E. L.

633.491:581.192(76.3)

Comparative dry-matter content of varieties of Irish potatoes grown in Louisiana.

Amer. Potato J. 1947 : 24 : 73-76.

An analysis of the dry matter content of ten potato varieties was made in 1944 and 1945. Significant intervarietal differences in dry matter content were recorded.

1685.

WILLIGEN, A. H. A. DE

633.491:581.192:578.08(49.2)

De chemische samenstelling van den aardappel. (The chemical composition of the potato).

Landbouwk. Tijdschr. Wageningen 1942 : 54 : 693-725.

The present day requirements of different classes of potato consumers are very varied.

The chemical composition of the tuber is here discussed under: starch content; sugars; vitamin C; protein substances; and ash.

The technique of starch determination receives special attention with particular reference to specific gravity determinations by submerging in water, in relation to dry matter content; some of the results cited are from over 6000 samples examined by an Industrial Potato Commission in Holland.

The discussion is fully documented.

1686. PERLOVA, R. L. 633.491:581.47:582(47)
**[The morphology of the berries as a taxonomic character of
tuber-bearing species of *Solanum* L. (section *Tuberarium* Bitt.)]**
Botaničeskii Žurnal (J. Bot. U.R.S.S.) 1946 : 31 : No. 2 : 19-32.

The taxonomic value of the berries of tuber-bearing *Solanum* species has been recognized by a number of investigators, but, as the author points out, some of the species only form berries at high altitudes. Descriptions are given of the berries of 42 potato species and botanical varieties which have been grown in the Pamir mountains. The conclusion is reached that the morphological characters of the berries enable distinctions to be made even between sub-divisions of a species, including races based on cytological evidence. I. Z.

1687. ZVEREVA, P. A. 633.491-2.111-1.521.6:575.127.2:581.165.5:581
165.71(47)
**(Overcoming uncrossability in potatoes by means of vegetative
rapprochement).**

Agrobiologija (Agrobiology) 1946 : No. 2 : 126-28.

Hybrids have been obtained for the first time between *Solanum tuberosum* and *S. Schreiteri*; they are resistant to frost and have a number of other valuable features too. Direct crossing of the domestic variety Smyslovskii [Fürstenkrone] with *S. Schreiteri* gave no result, but when seedlings of *S. Schreiteri* were grafted on to Fürstenkrone plants, one of the grafts developed characters intermediate between the two species, and when it flowered, its pollen was crossed with various domestic varieties and produced viable seed. Four seedlings were obtained from the cross with Epicure and survived frosts of -6° C.; they yielded from 189 to 500 gm. per plant in the first year. The hybrids differed in morphological features but were all very vigorous. Only hybrid No. 2 set seed when pollinated with domestic potatoes. A great variety of types was obtained in this progeny, including a number of floral and other anomalies. Most of the seedlings however were self-fertile.

1688. BRUYN, H. L. G. DE 633.491-2.3-1.521.6:581
Aardappelschurft en vruchtopvolging. **(Potato scab and crop
rotation).**
Tijdschr. PlZiekt. 1943 : 49 : 100-08.

Results of pot experiments showed that crop rotation is one factor that may affect the susceptibility of potatoes to scab. Bintje, which is susceptible to both superficial and deep scab (*Actinomyces*), and Eigenheimer, which is affected by the deep strain only, were used in the experiments.

1689. SEINHORST, J. W. and 633.491-2.6-1.521.6:575.127.2
DUNLOP, M. J.
De aantasting van enige *Solanum*soorten en enige kruisingen tussen
Solanum demissum en *S. tuberosum* door het stengelaaltje *Ditylenchus
dipsaci* (Kuhn) Filipjev. **[The infestation of some species of *Sola-
num* and some crosses between *S. demissum* and *S. tuberosum*
by stem eelworm, *D. dipsaci* (Kuhn) Filipjev].**
Tijdschr. PlZiekt. 1945 : 51 : 73-81.

The reaction of tubers and stems of *Solanum* spp. and hybrids to experimental infestation with stem eelworm was investigated, with reference to the affinity of the pest for the species or strain of the host and to the defence reactions of the infested tissue. Defence reactions consist in suberization of parenchyma cell walls in the infested area, and the development of cork and gum layers, forming tissues of different morphological structure in different species or strains.

The stems exhibited no defence reactions.

A table is given showing the affinity and defence reactions for two strains of *S. demissum*, two strains of *S. Antipoviczii*, *S. chacoense*, *S. andigenum* (Aya papa), some hybrids including *S. demissum* x Frühmölle, and Eersteling. The effects in the tissues are also illustrated by diagrams.

S. demissum, *S. Antipoviczii* and *S. andigenum* are recorded as new hosts of *D. dipsaci*.

1690. MADSEN, S. B. 633.491-2.8-1.521.6(48.9)
Om Bekaempelse af Kartofflens virussygdomme saerlig ved Foraedling og Fremavl. (**On the control of virus diseases of the potato especially in breeding and propagation**).
Medd. VetHøjsk. Landbr. Plant. 1944 : No. 23 : Pp. 85.

This communication gives information on virus diseases and their distribution. In particular, it deals with potato viruses including synonyms, symptoms on different varieties of potatoes, modes of infection, and possible control methods which include the "cure" of diseased plants by vaccination, the breeding of resistant varieties and the propagation of sound stocks.

The simplest way to obtain resistant varieties would be to produce varieties resistant to the aphids as has been done in the case of the Colorado beetle, breeding from *Solanum polyadenium*.

In discussing the nature of resistance, three types, namely, tolerance, resistance and immunity, are defined, and gradations between them discussed. The aim in breeding must be varieties immune to the most injurious viruses, or at least varieties with high tolerance combined with high resistance.

The possibilities of existing cultivated varieties for use as initial breeding material should be examined. Results cited from C. A. Jørgensen, O. Nielsen, K. Opitz, K. O. Müller and E. Köhler show that some domestic varieties of potatoes are to some extent resistant but that there is no question of immunity to viruses in general. The work begun with South American species is promising.

Methods of virus diagnosis, including the serum technique, are discussed in detail.

The practical results so far obtained are examined with reference to the work of Müller, E. S. Schultz *et al.*, and K. Smith, and suggestions are made regarding the natural conditions under which breeding operations should be conducted. So far there are few Danish varieties tolerant to viruses, as breeding has usually been done on estates where the danger of infection is slight. The variety Tylstrup Odin, is, however, probably highly tolerant.

Cultivation problems are discussed in relation to breeding, and different methods of distinguishing diseased and sound plants are assessed.

Virus control organization in different countries is also considered.

1691. SCHERMERHORN, L. G. 633.492(74.9)
Jersey Orange sweet potato.
Hort. News N.J. 1947 : 28 : p. 1920.

The Orange Little Stem 35 sweet potato shows promise as a type suitable for growing in New Jersey. The strain was originally obtained from Kansas; it has a brown skin and orange coloured flesh. Since it has equalled New Jersey in yield, disease resistance and keeping qualities, and has proved to be acceptable to the consumer, it is to be released under the name Jersey Orange. When cooked its flesh is not so dry as that of Yellow Jersey. It has been released with the chief intention of competing with the so-called yams; Yellow Jersey will remain the standard variety.

FIBRES 633.5

1692. 633.51:575(81)
Nova linhagem de algodão em São Paulo. (**A new strain of cotton in São Paulo**).
Bol. Minist. Agric., Rio de J. 1944 : 33 : 157-58

The production of a new strain of cotton for São Paulo, Brazil, is announced by the Instituto Agrônômico de Campinas.

1693. 633.51:575(81)
Trabalhos na Estação Experimental de Sete Lagoas. (**Work at the Experimental Station of Sete Lagoas**).
Bol. Minist. Agric., Rio de J. 1943 : 32 : No. 11 : 117-18.

Selection and hybridization work on cotton is reported from Sete Lagoas in the State of Minas Gerais, Brazil.

1694. KIME, P. H. and

TILLEY, R. H.

633.51:575.125(73)

Hybrid vigor in Upland cotton.

J. Amer. Soc. Agron. 1947 : 39 : 308-17.

Literature on hybrid vigour in interspecific and intraspecific crosses of cotton is reviewed. Hybrid vigour was studied during a three-year period in crosses between inbred lines selected from the Coker 100, Stoneville and Deltapine IIA varieties of Upland cotton (*Gossypium hirsutum*); Coker 100 and Stoneville are related cottons.

On the basis of a comparison with the parent possessing the higher value for a given character, F_1 hybrid vigour was shown in yield of seed cotton, lint yield, lint index, earliness and rate of blooming. No heterotic increase was, however, observed in the weight of the plants after harvesting, plant height, seed index (weight of 100 seeds), boll size, and fibre strength and length. It appears that hybrid vigour in Upland cotton is expressed in the characters contributing to greater yield rather than in an increased growth of the plant parts. Both the F_1 and F_2 generations showed considerable hybrid vigour in comparison with the parental mean values, the F_2 showing a decrease in hybrid vigour approaching 50% when compared with the F_1 . In the F_3 generation hybrid vigour showed a still greater reduction.

The practical application of these results is discussed.

1695.

633.51:576.3

633.51:576.356.5

633.51:576.16

STEPHENS, S. G.

Cytogenetics of *Gossypium* and the problem of the origin of New World cottons.

Advances Genet., N.Y. 1947 : 1 : 431-42.

A useful review is given of cytogenetical investigations of *Gossypium*, with a discussion of their bearing upon the classification of the genus and the problem of the origin of the New World cottons.

1696. HANCOCK, N. I.

633.51:581.14:581.6:519.271.3

Variations in length, strength, and fineness of cotton fibers from bolls of known flowering dates, locks, and nodes.

J. Amer. Soc. Agron. 1947 : 39 : 122-34.

Variations in the length, strength and fineness of the cotton fibre were studied in relation to the structural development of the plant during the fruiting period. The varieties investigated included Stoneville 2, Trice 90-1 and Wilds 1. Sampling methods are discussed in the light of the data obtained.

1697. ŽURBIN, A. I.

633.51:581.165.71:581.145(47)

Influence of grafting upon the generative sphere in cotton-plant.

C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : 46 : 375-78.

Grafting experiments carried out to study the influence of the stock upon reproduction in the scion are described. It is reported that different graftings showed differences in the time of inception of flowering, the intensity of flowering, the number of ovaries shed, the development of anthers and ovules, and the number of mature bolls and seeds, and that these differences depended upon the genetical affinities between stock and scion. The time of the first flowers and the rate of blooming and the number of mature bolls showed hastening and increase with greater genetical disparity, while the fertility of anthers and ovules appeared to increase the closer the affinity between stock and scion.

1698.

633.51:581.6:575.12(81)

Novo híbrido de algodão nas culturas paraibanas. (A new cotton hybrid for cultivation in Paraíba).

Bol. Minist. Agric., Rio de J. 1944 : 33 : No. 9 : 127-28.

By hybridizing the local variety Mocó with fine quality Egyptian cottons, Faria has produced superior types with long fibres, one of which bears 72% of fibres exceeding 34mm. in length.

1699. MURLEY, M. R.

633.512:582(77.7)

Apocynum in Iowa.

Iowa St. Coll. J. Sci. 1947 : 21 : 229-35.

A classification key of *Apocynum* species and varieties found in Iowa is presented, together with descriptive notes.

1700. FLOR, H. H.

633.52-2.452:576.16:631.521.6:575(73)

Inheritance of reaction to rust in flax.

J. Agric. Res. 1947 : 74 : 241-62.

The inheritance of reaction to rust (*Melampsora Lini* (Pers.) Lév.) was analysed in 16 differential varieties, and 4 other varieties, by investigating the reaction of appropriate crosses to selected physiological races. Resistance has been found to be invariably inherited as a dominant character. At least 19 distinct factor pairs are involved in controlling the reaction of the 16 differential varieties. Additional rust conditioning factors were found in the four other varieties studied. Most of these factors are arranged in three allelomorphous or linked groups, viz., *L*, *M* and *N*. The factors of the *L* and *M* series are allelomorphous; those of the *N* series appear to be linked. The following genotypes are suggested for the 16 differential varieties.

Ottawa, 770B, *LL mm nn*; Newland, *ll MM nn*; Bombay, *ll mm NN*; Williston Brown, *ll M¹M¹ nn*; Akmolinsk, *ll mm N¹N¹*; J.W.S., *L²L² mm nn*; Pale Blue Crimped, *L³L³ mm nn*; Kenya, *L⁴L⁴ mm nn*; Abyssinian, *ll mm N²N²*; Leona, *ll mm N³N³*; Tammes Pale Blue, *ll mm N⁴N⁴*; Buda, *L¹L¹ M²M² nn*; Williston Golden, *L⁵L⁵ M¹M¹ nn*; Bolley Golden, *ll M³M³ nn*, also a factor outside the *L*, *M*, *N* series; Italia Roma, *ll M³M³*, and probably a third factor pair in the *N* series; and Morye, *L⁶L⁶ mm*, and a factor outside the *L*, *M*, *N* series. The Morye variety was not tested with regard to the *N* series.

The genotypes of the four additional varieties are analysed as follows: Billings, *ll M⁴M⁴ nn*; Minn. 25-107, *L⁷L⁷ mm nn*; Pale Verbena, *ll M⁵M⁵ nn*; and Rio, *L⁶L⁶ M⁶M⁶ N⁵N⁵*.

A parallelism has been observed in the linkage between certain factors for rust reaction in the host and those for pathogenicity in the fungus (cf. Abst. 767). Evidence has been obtained however suggesting that linkage between pathogenic factors transcends the linkage of the factorial groups determining host resistance. The value of this genetical analysis to future breeding investigations on rust resistance is discussed.

1701.

633.52-2.482-1.521.6(71)

VANTERPOOL, T. C.

633.854.54-2.482-1.521.6(71)

***Selenophoma linicola* sp. nov. on flax in Saskatchewan.**

Mycologia 1947 : 39 : 341-48.

A new fungus infecting flax is recorded, *S. linicola*. It has been found on the following varieties: Arrow, Bison, Bolley's Golden, Buda, Crystal, Custer, Dakota, Malabrigo, Redson, Redwing, Rocket, Royal, Sheyenne, Victoria and Stormont Cirrus. At present, it is of no economic importance.

1702. CRANE, J. C.

633.524.35

Roselle (*Hibiscus sabdariffa* L.) as a fiber crop.

Div. Latin Amer. Agric., U.S. Dep. Agric. 1943. Pp. 47. (Mimeographed).

Information on *H. Sabdariffa* is reviewed, with reference to varieties, genetics and cytology, root development, response to day length, yields, uses, diseases and insect pests, and other topics. The bibliography includes 83 references.

1703. ALMEIDA, J. L. FERREIRA DE

633.584.3:575.312.32

Sobre a cariologia de *Salix salviifolia* Brot. e *S. babylonica* L. (The caryology of *S. salviifolia* Brot. and *S. babylonica* L.)

Bol. Soc. Broteriana 1946 : 20 : 201-42.

Meiosis is described in *S. salviifolia* and *S. babylonica*. In the former, there are $2n = 38$ chromosomes, with 1-4 supernumerary heterochromatic chromosomes. Secondary association was observed in both species, whence it was concluded that the basic chromosome number of the ancestral type from which the two species have been derived was $n = 8$. In the light of these and other findings, the author discusses the probable course of cytotypic evolution in *Salix*.

SUGAR PLANTS 633.6

1704. ARCENEUX, G.,
 HEBERT, L. P. and
 MAYEUX, L. C. (JUN.) 633.61.00.14(76.3)
Results of sugarcane variety tests in Louisiana during 1946.
 Sug. Bull., N.O. 1947 : 25 : 141-46, 155.

The results of the 1946 co-operative field tests of commercial sugar cane varieties and promising unreleased seedlings on three different types of soil in Louisiana are summarized.

1705. GOUAUX, C. B. and
 TAGGART, W. G. 633.61.00.14(76.3)
Sugar cane test fields—Season of 1946.
 Sug. Bull., N.O. 1947 : 25 : 147-57.

A report is given of the 1946 trials of ten commercial sugar canes and 24 unreleased varieties under experimental conditions in Louisiana.

1706. LEACH, L. D. 633.63-2.411.4-1.521.6:575.42(79.4)
Effect of downy mildew on productivity of sugar beets, and selection for resistance.
 Hilgardia 1945 : 16 : 317-34.

Tests of the resistance of commercial sugar beet varieties grown in California to *Peronospora Schachtii* Fuckel were carried out during the period 1937-39. Significant varietal differences in susceptibility were recorded, but similar differences were also shown by the different seed lots of the same variety planted in different seasons. The most resistant varieties appeared to be U.S. 15, R. and G. AA., and one strain of R. and G. Old Type; but no variety could be considered highly resistant. Selection for resistance has been carried out in five commercial varieties, using the seedling inoculation method. From the comparison between the progeny of selected seedlings with the parental material, it appears that resistance has been considerably improved by selection.

STIMULANTS 633.7

1707. GOODSPEED, T. H. 633.71:576.354.46:575.127.2
Meiotic prophase phenomena in species and interspecific hybrids of *Nicotiana*.
 J. Arnold Arbor. 1946 : 27 : 453-69.

A review is presented of the course of meiosis in species and interspecific hybrids of *Nicotiana*. Evidence is provided to support the conclusion that the degree of chromosome pairing at meiosis I in the interspecific hybrids is a reliable index of the phylogenetic relations of the parent species.

1708. WOLF, F. A. 633.71:581.143.26
Growth curves of oriental tobacco and their significance.
 Bull. Torrey Bot. Cl. 1947 : 74 : 199-214.

Growth curves have been determined for the tobacco varieties Izmir, Broussa, Dere, Stanimake and Yaka.

1709. CLAYTON, E. E. 633.71-2.3-1.521.6:575.127.2(73)
A wildfire resistant tobacco.
 J. Hered. 1947 : 38 : 35-40.

The production of a wildfire (*Pseudomonas tabaci*) resistant line, designated TL 106, by back-crossing a hybrid between *Nicotiana Tabacum* and *N. longifera* to *N. Tabacum* is described. The line TL 106 was obtained in the following way. Attempts were made to cross the two species, using tetraploid plants as parents. The few plants secured were weak in growth and completely sterile; one of these plants, however, produced shoots from a callus which were vigorous and highly fertile when pollinated by *N. Tabacum*. Line TL 106 was selected in the F₂ generation of the back-cross progeny thus obtained.

TL 106 is resistant to wildfire at all stages of growth from the earliest seedling stage to time of harvesting. In addition, it has proved resistant to water-soaking of the leaf tissues produced by rain and high humidity, and black fire disease caused by *Ps. angularata*. F₁ plants obtained by crossing TL 106 with standard tobaccos showed complete dominance of

wildfire resistance and outstanding hybrid vigour. It is stated that seed of this valuable line is available for distribution to plant breeders.

1710. 633.71.00.15:061.6(45)

Istituto Scientifico Sperimentale per i Tabacchi. (**The Scientific Research Institute for Tobacco**).

Tabacco 1947 : 51 : 2-5.

In continuation of a previous article (cf. Abst. 1265), reference is made to further research projects that have been undertaken in collaboration with other institutes. These comprise vernalization of tobacco seed, treatment of seed with vitamins and other growth substances, tests of various varieties resistant to root rot, and tests of varieties and selections in different zones of Italy.

1711. HÅKANSSON, A. 633.74:581.162.5

Some observations on the seed development in Ecuadorian cacao.

Hereditas, Lund 1947 : 33 : 526-38.

A cytological examination of cacao material previously described by Müntzing (cf. Abst. 1269), has shown that sterility is largely due to the failure of pollen to effect fertilization, or to the failure of the fertilized ovules to develop. It is suggested that cherelle wilting may be due to somatoplastic sterility, though it is admitted that excessive development of the nucellus is unlikely to be disadvantageous, since perisperm is normally developed in cacao. After incompatible pollinations, the normal inception of a second cycle of nuclear divisions in the somatic tissues of the ovule does not occur.

1712. MIRANDA, S. 633.74:581.6:575(81)

Problemas da produção de cacau fino na Bahia. (**Problems surrounding the production of high quality cacao in Bahia**).

Bol. Minist. Agric., Rio de J. 1944 : 33 : No. 1 : 61-69.

A discussion is presented of possible ways in which the growing of high quality cacao in Bahia, Brazil might be brought about. The old Comum, Maranhão and Pará varieties of *Theobroma leiocarpa* are not of high quality, while the *Th. Cacao* x *Th. leiocarpa* population introduced by Zehntner from Ceylon in 1907 is extremely variable, although some individuals approach Criollo in quality.

The introduction of Criollo trees from abroad is opposed through fear of introducing witches' broom. The most hopeful possibility for Bahia is believed to be the development of local mutants such as Catongo and Almeida.

CONDIMENTS 633.84

1713. OLÁH, L. 633.842:576.16(43.91)

A kalocsai népies fűszerpaprika származása. (**The origin of the capsaicin-free red pepper variety Kalocsa**).

Mesogazdaságtudományi Közlemények 1944 : 1 : 7-15.

An inbred line of the capsaicin-free red pepper variety Kalocsa, a popular spice variety, was found by the author in northern Hungary. It is considered that most probably the variety Kalocsa originated from the cross *Capsicum annuum* L. var. *longum* D.C. f. *szegediense* (Aug.) My. with either var. *abbreviatum* Fingerh. f. *erectum* My. or var. *grossum* (L.) Willd. f. *typicum* My. subf. *erectum* My. (cf. Abst. 1714). T. P. B.

1714. MÁNDY, G. 633.842:582(43.91)

A paprika alakutana mint a fajtaleírás alapja. (**The morphology of red pepper as a basis of varietal description**).

Bull. Hung. Coll. Hort. 1944 : 10 : 93-133.

A detailed review of literature on the taxonomy of red pepper (*Capsicum annuum* L.) is presented. The author then describes the morphology of the different varieties. After defining 22 main characters, and 167 other distinguishing features of the different varieties, he gives a useful taxonomic table. The main classification is as follows:—

A. Var. *typicum* Fiori, including f. *fasciculatum* (Sturt.) Irish, f. *oblongatum* Fingerh. and f. *acuminatum* Fingerh.

B. Var. *abbreviatum* Fingerh., including f. *erectum* My., f. *pendens* My. and f. *flavum* My.

C. Var. *grossum* (L.) Willd., including f. *typicum* My. with subf. *erectum* My. and subf. *pendens* My., f. *flavum* My., f. *coniforme* My. and f. *hispanicum* My.

D. Var. *lycopersiciforme* Aug., including f. *flavum* Aug., f. *rubrum* Aug. and f. *cerasiforme* Willd.

E. Var. *cerasiforme* Willd., including f. *rotundum* My. and f. *cordiforme* My.

F. Var. *longum* DC., including f. *ceratoides* Fingerh., f. *incrassatum* Fingerh., f. *brevipes* Fingerh., f. *luteum* Fingerh., f. *nigrum* My., f. *szegediense* (Aug.), f. *erectum* Fingerh. with subf. *erectum* My. and subf. *pendens* My., and f. *kalocsaiense* My. with subf. *erectum* My. and subf. *pendens* My. T. P. B.

1715. MÁNDY, G. 633.842:582(43.91)
Adatok a paprika (*Capsicum annuum* L.) fajtarendszertanához. [Data
on the taxonomy of red pepper (*C. annuum* L.)]
Mesogazdaságtudományi Közlemények 1944 : 1 : 21-32.

The taxonomy of red pepper is reviewed generally. The table of classification presented in a previous paper (cf. Abst. 1714) is supplemented by varieties not cultivated in Hungary, as follows: var. *typicum* Fiori, f. *angulatum* Fingerh. and f. *ovoideum* Fingerh.; var. *cerasiforme* Willd., f. *minus* Bess.; var. *longum* DC., f. *violaceum* Fingerh.; var. *conoides* Mill.; and var. *frutescens*, the perennial forms. T. P. B.

OIL PLANTS 633.85

1716. REYNTENS, H. 633.853.49:575.42(49.2)
Proeven op Winterkoolzaad. (Trials with colza). 633.853.49-2.111-1.521.6(49.2)
Meded. LandbHoogesch. Gent 1946 : 11 : 287-303.

How to increase yield by cultivation was the main problem in these trials. In 1941, 1872 plants of three varieties were planted, and seed from a number of selected plants was sown. One of the three varieties had more luxuriant foliage than the others, and in three lines in particular this feature was very marked. The trials showed that increased yields and leafy fodder with high frost resistance could be obtained by selection. Great variation in yield was observed between the different lines.

1717. OORT, A. J. P. 633.853.49-2.412.5-1.521.6:581.192
Bepaalt het gehalte aan mosterd-olie de resistentie van Cruciferen tegen knolvoet? (Does the mustard oil content determine the resistance of Cruciferae to club root?)
Tijdschr. PlZiekt. 1945 : 51 : 117-19.

After considering previous workers' findings on the subject, the writer points out that in many cases resistance to club root is determined by factors unrelated to mustard oil content, though a high content may result in resistance. But, as a high content also affects milk flavour, it is suggested that it would be interesting to examine the flavour of a number of varieties of turnips of known resistance or susceptibility.

1718. SPANGENBERG, G. E. 633.853.55:582(89)
A cultura da mamoneira. (The cultivation of the castor oil plant).
Bol. Agron. Brazil 1946 : 10 : 207-10.

In this article an account is included of the wild and cultivated botanical varieties and forms of *Ricinus communis* found in Uruguay.

1719. BARBERA, G. 633.853.55-1.524(45)
Il ricino nel piano autarchico. (The castor oil plant in the plan for autarchy).
Ital. Agric. 1941 : 78 : 49-57.

A study of the wild forms of *Ricinus* growing in Sicily, Calabria and elsewhere has shown the Sicilian form to be capable of growing and giving a satisfactory yield of seed in areas of low fertility, where it is not profitable to grow the more exacting cultivated forms or other more lucrative crops. The quality of the oil produced is equal or superior to that obtained from the cultivated forms.

1720. LUBOVSKAYA, N. 633.854.78:575.257:635.24(47)
Plant husbandry I. Vegetative hybrids of sunflowers and Jerusalem artichokes.
Agricultural Chron., Moscow 1946 : No. 10 : 2-3. (Mimeographed).

At the Voroshilovgrad Agricultural Institute the sunflower was grafted on to stocks of the

Jerusalem artichoke. It is reported that seed was obtained from the grafted material which gave rise to plants showing the smut and broomrape resistance of the stock. These "vegetative hybrids" are said to be 8-10 days earlier ripening than the sunflower variety No. 169, making it possible to grow sunflowers in the more northern areas. The seeds of the hybrids are described as large and nut shaped, with 37.6% fat content. The hybrids however showed the disadvantageous characters of branching. It is reported that non-branching plants were selected, whose seed transferred this character to the next generation.

1721. LUTIKOV, I. 633.854.78-2.5-1.521.6

(**Broomrape on sunflowers, and how to combat it.**)

Kolhoznoe Proizvodstvo (Collective Farming) 1946 : No. 12 : p. 29.

Sunflowers growing in poor dry soil are liable to infestation by races A or B of *Orobanche*. Varieties of sunflower resistant to race A bear evidence, in the form of nodular growths on the roots, of their struggle with the parasite. But such varieties are not necessarily resistant to the more virulent race B, which is now believed to consist of several races. The varieties Saratov 169, V.N.I.I.M.K., 4036 and 3519, and Kruglik A/41, are resistant to race Z. Those resistant to race B as well as race A are Nos 1646, 1813, 8281, 6432, Fuksinka, 62 and Zelenka 61; their roots are unaffected by the parasite and show no trace of its action. I. Z.

RUBBER PLANTS 633.91

1722. 633.912:576.312.35:582

BALDWIN, J. T. (JUN.)

633.912:575

***Hevea*: a first interpretation.**

J. Hered. 1947 : 38 : 54-64.

The author reduces the genus *Hevea* to the following nine species, basing his suggestion on the results of cytological investigations of material collected in the Amazon Valley: *H. Spruceana* (Benth.) Muell. Arg., *H. Benthamiana* Muell. Arg., *H. viridis* Huber, *H. confusa* Hemsley, *H. rigidifolia* (Spruce ex Benth.) Muell. Arg., *H. pauciflora* (Spruce ex Benth.) Muell. Arg., *H. guianensis* Aubl., *H. minor* Hemsley, and *H. brasiliensis* (Willd.) Muell. Arg. It was found that except for one clone of *H. guianensis* with a chromosome number of $2n = 54$ and the possible occurrence of a race of *H. pauciflora* with $2n = 18$, the genus apparently has a chromosome number of $2n = 36$ throughout its range of distribution and variation.

The complexity of the genus is discussed with reference to natural hybridization, the development of ecotypes, and geological changes in the Amazon Basin. Several illustrations of hybridity in the vicinity of towns are cited.

The author discusses the problems of breeding for resistance to *Dothidella* leaf blight and for high yield, making practical suggestions as to the collection of material.

1723. 633.912:582:576.12(81)

BALDWIN, J. T. (JUN.)

633.912-2.421.9-1.521.6

***Hevea rigidifolia*.**

Amer. J. Bot. 1947 : 34 : 261-66.

H. rigidifolia has been rediscovered by the Rio Uaupés, Brazil. Its morphology is described and its relationships to other species of *Hevea* elucidated; it has $2n = 36$ chromosomes. It is resistant to *Dothidella Ulei* P. Henn.

The Rio Uaupés area of Brazil is an important centre of variability of the genus *Hevea*. The author describes a series of atypical trees intermediate in various characters between the usually recognized species. The possible course of evolution of the genus is considered, also the question of whether it has hybridized with *Cunuria*.

1724. BRANDES, E. W. 633.912-2.4-1.521.6(73)

A borracha de torna-viagem à América. (**Rubber on the rebound to America**).

Bol. Minist. Agric., Rio de J. 1944 : 33 : No. 2 : 101-16.

A translation into Portuguese is presented of all but the last few paragraphs of an earlier article reviewed in *Plant Breeding Abstracts*, Vol. XI, Abst. 1065.

1725. GARDNER, E. J.

633.913:581.16:575

Studies on the inheritance of apomixis and sterility in the progeny of two hybrid plants in the genus *Parthenium*.

Genetics 1947 : 32 : 262-76.

Crosses involving two natural guayule-mariola hybrids, designated 42418 and 22-7 respectively, were studied with regard to the inheritance of apomixis and sterility.

Counts of the progeny of hybrid 42418 showed that the plants had chromosome numbers ranging from $2n = 70$ to 95. Three plants were chosen from the progeny of hybrid 42418 as seed parents; they were designated 3053-10, 3053-14 and 3053-19. Each plant was selfed, and crossed with a commercial guayule strain 593, a $36+$ chromosome sexual guayule strain (accession 4255), and mariola. Plants of the 3053 culture were also open-pollinated. Young plants representing the third generation from the hybrid 42418 were obtained by selfing the material resulting from these open and controlled pollinations. The plant 22-7, having $2n = 54+$ chromosomes, was derived from a natural cross between a sexual guayule having $2n = 36+$ chromosomes and mariola. Crosses were carried out between 22-7 and accession 4255 ($2n = 36+$); the selfed and open-pollinated progeny of 22-7 were also studied. The characters investigated as an indication of the variation shown by progenies of hybrids 42418 and 22-7 were as follows: plant height and spread, length of leaf, length of petiole, width of leaf, number of points per leaf, and in the case of the progenies involving 22-7, pollen grain size.

Variation in the progenies derived from 42418 indicated that reproduction was predominantly sexual; and that the factors controlling the major sexual processes were dominant. A gradation was observed in the degree of sexuality, which is interpreted on the basis of segregation of modifying quantitative factors. Data on percentage germination showed a high degree of self-incompatibility, which was considerably greater in the second selfed generation than the first. It is suggested that this type of sterility was determined by quantitative recessive factors which came into expression through the selfing of plants produced from crosses involving self-sterile strains. Some of these factors, it is further suggested, undoubtedly influence the rate of pollen germination and the development of the pollen tube.

Hybrid 22-7 proved to be partially sexual. The progeny resulting from the crosses could be readily classified into plants resembling the hybrid mother plant 22-7, and those resembling guayule plants and showing wide variation among themselves; many plants of the latter group strongly resembled the $36+$ chromosome strain (accession 4255) which had been used as the pollen parent. The progeny resulting from the selfs were all like the mother plant 22-7; but the number of progeny was small; from more than 500 seeds only 15 plants developed. This indicated that the plants were not capable of self-fertilization, but that a comparatively few eggs developed as the result of pseudogamy. Out of the total of 98 plants obtained from the cross 22-7 x accession 4255, 46 resembled the mother plant and were the result of apomixis, while 52 had been produced by amphimixis. Out of the total of 75 plants secured by open-pollination, 40 were apomicts and 35 amphimicts. The development of apomictic polyploids from a cross involving a sexual diploid has therefore been observed in the production of 22-7 and in the progeny of the cross 22-7 x accession 4255.

The results are discussed with reference to the origin of apomixis and polyploidy in *Parthenium*. The data suggest that apomixis, failure of reduction, failure of fertilization and pseudogamy are genetically independent.

FRUITS AND NUTS 634

1726.

634.575(47)

Horticulture. 1. A prominent horticulturist.

Agricultural Chron., Moscow 1946 : No. 8 : 7-8. (Mimeographed).

The work of Petrov at the Moscow Fruit and Berry Experimental Station is briefly described. Particular mention is made of the Mysowka and Komsomolka strawberry varieties produced by crossing the Grove and Wonder Ketena varieties and by further selection. These new strawberries are cold resistant, high-yielding and suitable for transport.

Petrov is working along the lines of Mičurin, and has also grown several varieties of frost resistant apples.

1727. GORŠKOV, I. S. 634:575.127(47)
(The work of the I. V. Mičurin Central Fruit Genetics Laboratory).
 Agrobiologija (Agrobiology) 1946 : No. 2 : 75-86.

The laboratory is pursuing the lines of work started by Mičurin. Considerable success has attended the method of back-crossing the Mičurin hybrids with superior foreign varieties, and by applying Mičurin's methods of intermediary hybrids, pollen mixture and vegetative *rapprochement*, a number of wide crosses have been successfully made. These include hybrids of apple with pear, *Prunus Besseyi* with apricot, *Prunus Besseyi* with *Crataegus tomentosa*, sloe with peach, plum with peach, almond with peach, sweet with sour cherry, sour cherry with peach, currant with gooseberry, Krandle currant with black currant, and the garden strawberry with *Fragaria elatior*. The apple-pear hybrids are intermediate in properties and more winter hardy than either of the parent species; they fruited in 1944. The hybrid of *P. Besseyi* x *Armeniaca vulgaris* bore fruit at two years of age and flowers a fortnight later than the apricot, in consequence of which it escapes the spring frosts. Fertile hybrids between sweet and sour cherries have been obtained in spite of the difference in chromosome number; some of the fertile hybrids were triploid, others were tetraploid. The method of intermediary hybrids has been used successfully in strawberries, and a hybrid of *Fragaria grandiflora* x (*F. elatior* x *F. neglecta*) is of great interest for further crossing with the garden strawberry. Fertile 28-chromosome hybrids have been produced by the same method from *F. elatior* x *F. neglecta* x *F. orientalis* and are also of some considerable interest for breeding purposes.

Further data have been obtained regarding the influence of the mentor. Thus cuttings of the hybrid Okey's plum x Amsden peach, having green leaves, were grafted on to Cisten's plum, a red leaved plum variety, and their own leaves also became red. Hybrids of *P. Besseyi* x *C. tomentosa* have round red fruits, but when grafted on *P. Besseyi* produce elongated black fruits with increased tannin content. Tender hybrids of northern x southern pears were grafted on the hardy *Pyrus ussuriensis*, and when the leaf system of the scion predominated the grafts were killed by frost, but when that of the rootstock predominated they were hardy. Several hybrids of *P. Besseyi* x apricot proved hardy when grafted on *P. Besseyi* and on the Siberian apricot, but not when on southern apricot varieties.

The vitamin C content of the tomato Jubileinyi [Jubilee] increased when it was grafted on to a form with high vitamin content. Conditions of growth had a great effect upon the character of interspecific hybrids, both on fertility and on morphological characters such as spine formation for example; cuttings were taken from a sterile hybrid of black currant x gooseberry, and when grown in very rich, moist earth they bore abundant fruit.

Fifty-five of Mičurin's varieties have now been included in the list of standard fruit varieties for the U.S.S.R., and several hundred others are still under observation and showing great promise as regards their combinations of winter-hardiness, yield and fruit quality; in the period 1925 to 1944, some five million rootstocks were grafted with Mičurin varieties in orchards all over the U.S.S.R., but particularly in Siberia, for whose rigorous conditions Mičurin's varieties were specially intended. His vine rootstock Buŭtur is so frost resistant that it has enabled vines to be cultivated in extensive areas where they were unknown hitherto.

1728. LESJUK, E. A. 634:575.127(47)
(Results of the industrial and biological study of I. V. Mičurin's varieties).

Agrobiologija (Agrobiology) 1946 : No. 2 : 120-22.

Observations have been made on the behaviour of the Mičurin varieties now growing in the orchards. The most frost resistant apples were Esaul Ermaka, Kitaika Anisovaja [Anise Crab], Kitaika Desertnaja [Dessert Crab], Kitaika Zolotaja [Golden Crab] Taežnoe, Filja and Flava; pears distinguished for frost resistance included, Beurré Zelenaja Letnjaja [Winter Green Beurré], Beurré Kozlovskaja and Beurré Blankovaja, while frost resistant

sour cherries obtained from crossing cultivated varieties with *Prunus fruticosa* included Nadežda, Krupskaja, Polžir, Polevka and Plodnorodnaja Mičurina [Michurin's Prolific]. Many of the Mičurin apple varieties begin to bear fruit early, in the fourth to fifth year after budding, and many of them are characterized by high yields, up to 245 kg. per tree. The most productive varieties are named for the apples and other fruits; also those characterized by the best dessert quality, most attractive appearance of fruit, highest keeping capacity and resistance to scab and other diseases.

1729.

ISAEV, S. I.

634:575.182

634:575.3

(The role of the maternal plant in the formation of the hereditary constitution in hybrids).

Agrobiologija (Agrobiology) 1946 : No. 2 : 87-96.

In 1938 over 60,000 apple seedlings from various parental combinations were sown, and in the following year, after an extremely severe winter, an examination of the seedlings showed that in crossing varieties similar in winter hardiness, such as central Russian varieties x central Russian varieties or Mičurin varieties x Mičurin varieties, the hardiness of the seedlings was the same in direct and reciprocal crosses. The differences between reciprocal hybrids became evident when varieties differing in winter hardiness were crossed, as for instance the central Russian variety Antonovka with the less resistant Baltic variety Pepinka Litovskaja [Lithuanian Pippin]. The difference was most marked in crosses between varieties with extreme difference in hardiness, such as central Russian varieties and southern varieties. In such cases there was a definite and sometimes very marked reduction of hardiness when the southern variety was used as seed parent. Similarly, when Mičurin's *Sphaerotheca* resistant gooseberry was used as seed parent, the majority of the hybrids were resistant, whereas in the reciprocal cross, the hybrids were mainly susceptible. In the plum cross Vengerka Ažanskaja x Skorospelka Rozovaja, only one out of 71 seedlings survived the winter, whereas in the reciprocal cross 78 out of 213 survived. Puškarev found that when the blight resistant hybrid of *Solanum demissum* x *S. tuberosum* was crossed with domestic varieties, it gave 10% more resistant hybrids when serving as seed parent.

It is pointed out that the phenomena of matrocliny have been ignored to a great extent by genetical investigators, largely, it is thought, because they are not susceptible of explanation by the principles of "formal" genetics. The explanation of cytoplasmic influence is rejected, as recent investigations *in vivo* have shown the existence of cytoplasm even in the male gametes. The author therefore inclines to the Mičurin viewpoint that the hereditary constitution of the zygote is influenced by the environmental factors to which it is subjected in its early development. The maternal plant evidently acts as a particularly powerful mentor, acting as it does in the very early stages of the development of the embryo.

In support of this interpretation a further experiment is reported. A cross was made between Golden Grimes, a tender American apple, and Koričnœ Polosatœ [Striped Cinnamon], a hardy Russian form. The hybrid, contrary to expectation, was hardy, but it was found that the maternal plant of Golden Grimes was grafted on a rootstock of a hardy variety Antonovka, the nutrient materials of which had evidently influenced the hybrid. The utilization of this phenomenon in breeding work is recommended; thus for producing high quality hardy apples for Siberia, the maternal plant should be a hardy Reinette grafted on to a large fruited southern dessert form, so as to introduce the maximum influence of the dessert type.

1730. BULLOCK, R. M. and

SNYDER, J. C.

634:581.162.3:578.08(79.7)

Some methods of tree fruit pollination.

Proc. 42nd Mtg. Wash. St. Hort. Ass. 1946 : 215-26.

Experiments on the pollination of apple and sweet cherry by the dispersal of pollen mixtures from aeroplane sprays or bombs placed under the trees are described. No significant increase in fruit set in comparison with natural pollination was obtained by either technique. Experiments on pollen storage were also carried out. Pollen stored at 34° F. and 25%

relative humidity gave 40–60% germination after six months' storage, indicating the possibility of storing pollen from one season to the next.

1731.

ASTREGO, J. J.

Stuifmeelonderzoek bij enkele fruitsoorten onder glas. (Pollen studies

of some species of fruit under glass).

Landbouwk. Tijdschr. 1943 : 55 : 181–90.

634:581.162.5

634.22:581.162.5

Observations are recorded on pollen sterility and its causes in the peach, vine and green-house plums. The Golden Japan plum was partially self-sterile as well as cross-sterile.

1732.

DAY, L. H. and

TUFTS, W. P.

634-2.6-1.521.6(79.4)

Nematode-resistant rootstocks for deciduous fruit trees.

Circ. Calif. Agric. Exp. Sta. 1944 : No. 359 : Pp. 16.

A report is given of 15 years' work on the nematode resistance of roots of apple, quince, peach, apricot, nectarine, plum species, walnut and almond.

1733.

ČERNENKO, S. F.

634.11:575(47)

(Apple breeding in connexion with the choice of initial forms).

Agrobiologija (Agrobiology) 1946 : No. 2 : 97–110.

Crosses between different varieties of central Russian apples have been found to give a high proportion of winter-hardy seedlings, but some crosses of central Russian forms with southern forms produced an encouraging number of hardy seedlings too; several occurred for instance in the cross Borovinka x Winter Golden Pearmain; in tree and fruit characters, they resembled the Pearmain parent more than Borovinka, but in hardiness they surpassed both. Hardy seedlings were also obtained from the crosses Antonovka x Yellow Bellefeure, Candille Sinap x White Rosemary, and Medvežje Uško (Bear's Ear) x Candille Sinap.

Seedlings with good fruit quality have been obtained by using high quality parents, such as Winter Golden Pearmain, Simirenko Reinette and London Pippin, but some seedlings with good quality have also appeared in crosses between central Russian forms of only mediocre quality, such as Anis x Belyi Naliv (White Juice), Antonovka x New Borovinka, and Borovinka x Belyi Naliv. Most of these varieties give offspring with high yielding ability, but in this respect Pepin Litovskii (Lithuanian Pippin) is outstanding. This variety and Anis transmit fruit colour to their progeny, which are often more highly coloured than their parents. Seedlings of Aport, Antonovka Six Hundred Gramme, Landsberg Reinette and London Pippin often surpass the parents in fruit also. Winter Golden Pearmain transmits its excellent fruit form, especially in combinations with Borovinka, Aport and Antonovka.

Summer apples bear mostly early forms in their progeny, winter varieties mostly late forms, but exceptions also occur; an early ripening seedling was obtained for instance from the two late varieties Candille Sinap and White Rosemary 1221. Transgression for earliness was also observed in the crosses Anis x Belyi Naliv and Borovinka x Belyi Naliv. Transgression for lateness too has been observed in a number of combinations. The occurrence of transgression is explained by the rich phylogenetic history of the Russian varieties, with their complex hereditary constitution, together with the influence of environmental factors. A young seedling in its first years of development often resembles the wild parent more than the cultivated parent, towards which it changes gradually as it grows. Such characters as size and colour of fruit, flavour, and strength of attachment to the tree often change from the first year of fruiting to the later years, sometimes deteriorating but more often improving as the full season of bearing is approached.

An examination of the data concerning the progenies of each of the main varieties and the number of élites they have given rise to, shows which pollinating varieties are best for each of the seed parents; these are enumerated. Winter Golden Pearmain proves to be a specially good pollen variety and Borovinka a specially good seed parent. The characters which each variety tends to transmit to its progeny are also indicated.

1734.

Nationwide fruits—apples.

Amer. Fruit Gr. 1947 : 67 : No. 9 : p. 33.

A brief note is given on a new apple variety, patented by M. Bazzanella, of Mineral, Virginia, which escapes frost injury by blooming in the third week of May. The variety blooms a month later than the Winesap variety but ripens about the same time.

1735. HOWLETT, F. S.

634.11:575(77.1)

The Melrose apple.

News Lett. Ill. St. Hort. Soc. 1947 : No. 2 : p. 4.

An account is given of the new Melrose apple recently produced by the Ohio Agricultural Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1597).

1736. HUSZ, B.

634.11:575.183(43.91)

Az alma metaxeniájáról. (**A case of metaxenia in apples**).

Bull. Hung. Coll. Hort. 1942 : 8 : 128-35.

Metaxenia has been observed in apples growing in an orchard near Kecskemét, Hungary. The abnormal fruits were found on trees trained as cordons on a horizontal wire running about 40 cm. above the ground. Nearly 5% of the 1942 crop from cordons of the Jonathan apple planted among cordons of the White Winter Calville variety consisted of pale red to straw-coloured fruit, flattened in shape, and ribbed like a Calville. Various degrees of ribbing have also been observed in the fruit of other varieties, indicating the influence of the pollen from Calville.

T. P. B.

1737. KARMACSI, B.

634.11:575.257(43.91)

Egy almakiméra ismertetése. (**A report of an apple chimaera**).

Bull. Hung. Coll. Hort. 1942 : 8 : p. 169.

A chimaera was obtained by grafting a Winter Gold Pearmain tree with Jonathan. Two interesting coloured photographs are given.

T. P. B.

1738.

634.11:581.165.71:575"793"

PIROVANO, A.

634.11:575.257

Induzione di precocità ed anomalie in meli innestati su soggetti adulti a maturazione precoce. (**Induction of earliness and anomalies in apples grafted on adult early maturing root stocks**).

Ital. Agric. 1941 : 78 : 797-805.

Hybrids of the apple varieties Bianca di Luglio [July White] x Bismarck bore fruit after 8-9 years, but it was poor in quality, and 53 trees of the hybrid were grafted in 1937 with scions of the hybrid Calville Lésans x Reinette de Caux, leaving a certain number of branches of the rootstock with leaves still attached and vegetating. The scions fruited for the first time in 1940 and the fruit ripened a whole month earlier than that on the mother trees. In 1941 the leaves and branches were removed from the rootstock but the early ripening of the scion was maintained. The fruits of the grafted plants were almost twice the size and weight of those borne on ungrafted plants; they also had a slightly herbaceous flavour; both characters are of the rootstock variety.

A number of other cases, referred to as graft hybrids, in which the rootstock has exercised a distinct influence on the characters of the scion, are quoted from the author's experience with pears, vines and other fruits.

1739.

634.11:581.165.711:575(47)

BUDAGOVSKIĬ, V. I.

634:581.165.711:575.3

(I. V. Mičurin on root stocks for fruit trees).

Agrobiologija (Agrobiology) 1946 : No. 2 : 111-19.

It is recalled that Mičurin recommended specially the garden form of the Chinese crab (*Malus prunifolia*) for use as a winter hardy and drought resistant apple rootstock. A great variety of forms exists already but the range of variation can be extended by raising seedlings. Figures are given which show that trees on root stocks of *M. prunifolia* and some forms of *M. baccata* retained their roots almost undamaged in the severe winter of 1938/39. The *M. baccata* rootstocks however exert an unfavourable influence on the developing scion, and for this and other reasons are not recommended, except in the extreme north where other species will not grow.

For pears, the most suitable rootstock was *Pyrus ussuriensis*, and some special organization for the production of seed, which is the limiting factor in its extension at present, is recommended. The local Siberian pear Tonkovetka also gives hardy rootstocks; Mičurin's quince hybrid Northern is the best dwarfing stock. Reference is made to Mičurin's experiments in the production of hardy dwarfing rootstocks for apple, sloe and cherry. Promising rootstocks for sour cherry have been obtained by the author in the Fergana valley, growing among pistachios; they are highly resistant both to frost and drought. For the production of hardy apple rootstocks, the author has crossed Paradise type VIII with the garden forms of *M. prunifolia* and with a number of Mičurin's hardy seedlings, selecting the progeny for frost resistance and capacity for vegetative reproduction. The selected hybrids are now undergoing investigation.

1740. ZORIN, F. M.

634.13:581.143.32

(A pear forming vegetative fruits).

Agrobiologija (Agrobiology) 1946 : No. 2 : 135-39.

The so-called "vegetative pear" flowers normally in the middle of April, then some two to three weeks later it flowers again, the flowers this time being mostly double, with up to 20 petals and two, or sometimes three, calyces one above the other. These begin to fuse without fertilization, and leaves in the vicinity are also included. On other branches, the petiole of a leaf may swell, or the petioles of several leaves may fuse and together swell out to form a false fruit resembling a proper pear but having no connexion with floral organs at all. From the apex of this false fruit, proliferation may occur, giving rise to a second false fruit and so on. The form of the false fruits varies, but some resemble a normal fruit very closely, both in form and flavour.

The phenomenon seems to be characteristic of the variety, and not the result of any attack by disease organisms. In view of its exceptionally early ripening, high dessert quality, good yield and almost entire freedom from codling moth and other pests and diseases, the variety is interesting from a practical standpoint as well as theoretically.

1741. BECKER, J.

634.21:581.6:577.16(43.91)

Adatok fontossabb barackjaink kémiai összetételéhez. (Data on the chemical composition of some Hungarian apricots).

Bull. Hung. Coll. Hort. 1941 : 7 : 9-13.

Varieties of Hungarian apricot were analysed for sugar, acid and vitamin contents. The Kajszi apricot, an early maturing variety, has a slightly higher sugar and acid content than the late Rózsa variety. It is reported that Hungarian apricots have a carotene content of 2-3 mg. per 100 grm., no vitamin B, and an ascorbic acid content of 6-8 mg. per 100 grm. Some varieties have an ascorbic acid content of 10-15 mg. per 100 grm. T. P. B.

1742. MURARO, L. A.

634.22(81)

Ameixeiras—Especialidades de suas variedades. (Plums—Characteristics of the varieties).

Bol. Agron. Brasil 1946 : 10 : 147-48.

Plum varieties grown in southern Brazil are listed with indications as to their uses.

1743. PIROVANO, A.

634.22:575.127.2:634.25:581.037

Ibridi di pruni con peschi. (Hybrids between plums and peaches).

Ital. Agric. 1941 : 78 : 681-85.

In crosses of the Burbank plum with the peach Morellone di Luglio made in 1934, pollen was treated with an alternating electromagnetic field, and with ultraviolet, β and γ rays. The seeds from the electromagnetic treatment began to germinate two months earlier than the controls; the seeds from the other treatments were also earlier but not so much so. One intermediate type was obtained from the electromagnetic treatment but died in the severe winter of 1939. From the radium treatment, a form with small fruits that split when ripe was obtained, with small stones free from the flesh. The normal hybrid obtained from the untreated pollen is sterile, and the difference is ascribed to the reduced effectiveness of the characters of the peach parent resulting from the treatment of the pollen.

Hybrids between plum and apricot have been obtained by similar methods but these too appear to be of little practical interest.

1744.

A polinização nas ameixeiras. (**Pollination in plums**).

Bol. Agron. Brasil 1945 : 9 : Nos. 101-02 : p. 28.

A short summary in Portuguese is given of work done in the U.S.A. on the compatibility relations of plum varieties.

634.22:581.162.5

1745.

Husz, B.

634.23:581.162.5(43.91)

Előmunkálatok a meggy terméshozamának fokozásához. (**Investigations to increase the productivity of the Hungarian sour cherry**).

Bull. Hung. Coll. Hort. 1943 : 9 : 60-86.

The Hungarian sour cherry Pándy is a variety of excellent quality, with fruit medium to large in size. The bearing of this variety is, however, inadequate. Experiments by the author confirmed that the reason is complete self-sterility. Wild sour cherries, in themselves useful to the canneries, gave the best results as pollinators. The Reine Eugénie cherry and Koch's Improved sour cherry derived from the Ostheim variety also proved to be good pollinators. Mixed plantings of sweet and sour cherries are proposed. T. P. B.

1746.

MALIGA, P.

634.23:581.162.5(43.91)

Adatok a meggyfajták megtermékenyülési viszonyaihoz különös tekintettel a Pándy-meggyre. (**Data on the fruiting of different sour cherry varieties with special regard to the variety Pándy**).

Bull. Hung. Coll. Hort. 1944 : 10 : 287-319.

The sour cherry (*Prunus Cerasus*) is well-known for its self-incompatibility. The author made a great number of crosses to determine which varieties grown in Hungary could be planted together in orchards to overcome this incompatibility. The incompatibility of the Pándy sour cherry, which is otherwise one of the best varieties, constitutes a particular problem in Hungarian cherry production. This variety is the latest to flower; the author suggests that an earlier flowering variety should be bred from Pándy, or that a strain with less self-incompatibility should be selected. Until more satisfactory forms are available, it is recommended that Pándy should be grown with other varieties such as Royal Amarelle, Great English and Early May. The varieties Gros Gobet, Belle de Choisy, Caesar and Great English are self-compatible. T. P. B.

1747.

BECKER, J.

634.23:581.6:577.16(43.91)

Adatok fontosabb meggyfajtáink kémiai összetételéhez. (**Data on the chemical composition of some Hungarian sour cherries**).

Bull. Hung. Coll. Hort. 1941 : 7 : 3-8.

The sugar and acid contents of sour cherry varieties were investigated. It is stated that the carotene and vitamin B content of the different varieties is very small. The ascorbic acid content is usually 8-10 mg. per 100 grm. of fruit. T. P. B.

1748.

634.25:575(73)

Southland, new peach developed by USDA.

Canner 1946 : 103 : No. 12 : p. 24.

The Southland variety is the third new yellow-fleshed peach to be introduced commercially as a result of the breeding programme of the United States Department of Agriculture to develop superior peaches for the south-eastern states. Southland, which is a freestone type, ripens about 16 days before Elberta. The other two new peaches, Dixigem and Dixired (cf. Abst. 842) are suitable for the early season market. The Southland variety was obtained by self-pollination of Haleshaven; the latter variety originated from a cross between J. H. Hale and Southhaven. As a result of tests in Georgia, Mississippi and Louisiana, the new peach is recommended as a variety suitable for transport, and to replace the midseason Sullivan Elberta variety.

1749.

BLAKE, M. A.

634.25:575(74.9)

Three new late varieties of peaches for New Jersey.

Hort. News N.J. 1946 : 27 : p. 1894.

The new yellow-fleshed late maturing peach varieties, N.J. 145, N.J. 152 and N.J. 161, have been developed by the New Jersey Experiment Station. All the varieties ripen later than the Elberta variety. N.J. 152 is suitable for freezing purposes.

1750. BLAKE, M. A. 634.25:575(74.9)
Five New Jersey Station peach varieties were named during January, 1947.

Hort. News N.J. 1947 : 28 : p. 1917.

Descriptions are given of the new Cherryred, Wildrose, Summerrose, Goodcheer and Autumn peaches named in 1947 by the New Jersey Agricultural Experiment Station. Cherryred has yellow flesh which is also deeply coloured with red; the fruit is a firm cling-stone type, maturing earlier than Early Wheeler or Redbird. Wildrose and Summerrose are white fleshed, early maturing freestone peaches. Goodcheer is a yellow-fleshed freestone type; it ripens a little later than Elberta. Autumn, another yellow-fleshed variety, ripens later than Late Crawford, and its buds are more winter hardy than those of Elberta.

1751. DERMEN, H. 634.25:581.04:576.356.5
Inducing polyploidy in peach varieties.
 J. Hered. 1947 : 38 : 77-82.

Experiments on the colchicine-induction of peach polyploids in the orchard and greenhouse are described. The results obtained by the colchicine treatment were found to be similar to those observed in the case of the cranberry. Sectorial and periclinal diploid-polyploid chimaeras were usually produced, which were recognizable by the size of the stomata and other characteristics of the leaf. The author suggests a technique likely to be most successful in the production of polyploid forms of peach in the greenhouse. This consists of treating the shoots of one-year-old trees with a 1% colchicine solution in water to which two drops of 10% Santomerse have been added to each 10 cc. of the solution.

1752. CARYL, R. E. and JOHNSTON, J. C. (reviser) 634.3(79.4)
Citrus culture in California.
 Circ. Calif. Agric. Ext. Serv. 1940 : (revised 1946) : No. 114 : Pp. 46.

Citrus fruit varieties grown in California are described; information is also given on the rootstocks used.

1753. RUGGIERI, G. 634.31:575.247(45)
Le mutazioni vegetative nella patologia degli agrumi. (Vegetative mutations in the pathology of the citrus fruits).
 Bol. Staz. Pat. Veg. Roma 1942 : 22 : 119-30.

The mandarin has given very few bud mutations during the last 100 years of cultivation in Italy, in contrast to the orange and the lemon which have given rise to a great number. A vegetative mutation of the orange Tarocco with oblong-spatulate leaves is described; the fruits are typical of the variety Tarocco in form, colour and flavour but are not quite so large. The mutant form however grows at a slower rate and should on this account be eliminated whenever it appears. Another bud mutant with coarse fruits of inferior quality has been observed in the same variety and also in the variety Ovale. A mutant of the latter variety known as Allapato surpasses the normal form in rate of growth and fruit yield and so tends to spread; it too has coarse fruits and should be eliminated. The bud mutations seem to occur more frequently in hot than in cooler zones.

1754. CONDIT, I. J. 634.37:578.088
Fig characteristics useful in the identification of varieties.
 Hilgardia 1941 : 14 : 1-68.

The identification of fig varieties is discussed with reference to a large number of characters. An extensive bibliography is included.

1755. SCHWARZENBERG F., C. 634.413:581.162.3:575.12(83)
Polinización artificial del chirimoyo. (Artificial pollination of the cherimoyer).
 Agric. Tec. Chile 1946 : 6 : 156-72.

Artificial self-pollination of the Chilean varieties Bronceada, Concha and Concha Lisa has resulted in a greatly increased fruit set. Intervarietal crossings involving these three varieties produced inferior fruit sets.

1756. SCHUSTER, C. E. 634.5-1.524(73)
Notes on the history of nut production in the Pacific Northwest.
 36th Rep. and 59th Mtg Ore. St. Hort. Soc. (30th Mtg West. Nut Gr.
 Ass.) 1944 : 99-104.

Historical notes are given on the introduction of walnuts and filbert varieties in the Pacific north-western part of the United States.

1757. BATCHELOR, L. D.,
 BRAUCHER, O. L. and
 SERR, E. F. 634.51(79.4)
Walnut production in California.
 Circ. Calif. Agric. Exp. Sta. 1945 : No. 364 : Pp. 34.

Notes are included on walnut varieties suitable for use in California.

1758. FERNANDES, C. T. 634.53(46.9)
 A castanha e suas características da ponta de vista comercial. (**The chestnut and its characteristics from the commercial point of view**).
 Junta Nac. Frutas, Lisboa 1946 : 6 : 558-63.

Descriptions are included of the Portuguese varieties Judia, Longal, Martainha, Côta and Aveleira.

1759. FERNANDES, C. T. 634.53(46.9)
 O castanheira na distrito de Vila Real. (Concelhos das zonas Centro e Leste). [**The chestnut in the district of Vila Real (Communes of the central and eastern zones)**].
 Junta Nac. Frutas, Lisboa 1946 : 6 : 816-45.

A table is included of the common and uncommon chestnut varieties grown in the Vila Real district, Portugal.

1760. REED, C. A. 634.53(73)
The 1946 status of Chinese chestnut growing in the eastern United States.
 Nat. Hort. Mag. 1947 : 26 : 83-93.

A general account is given of the Chinese chestnut (*Castanea mollissima*) in the eastern United States. Notes are included on the Carr, Hobson, Reliable, Stoke, Yankee, Zimmerman and Abundance varieties.

1761. BECKER, J. 634.53:581.6(43.91)
 A nemes gesztenye táplálkozási értékéről. (**The nutritive value of the chestnut**).
 Bull. Hung. Coll. Hort. 1942 : 8 : 122-27.

The author found no appreciable differences in the quality of Hungarian and foreign chestnut varieties. The addition of 25% chestnut flour to wheat flour is said to give an excellent bread with high protein and phosphorus content. Bread containing chestnut flour is considered to be more satisfactory than bread containing potato flour. T. P. B.

1762. SANTOS, E. 634.6(81)
 O dendezeiro. (**The oil palm**).
 Bol. Minist. Agric., Rio de J. 1945 : 34 : 97-102.

In this review of oil palm cultivation in Brazil, two varieties are described: Verdadeiro [Genuine] and Caboclo.

1763. SCHRADER, O. L. 634.62:575
 Contribuição ao estudo da tamareira no Brasil (*Phoenix dactylifera* L.). [**Contribution to the study of the date palm in Brazil (*Ph. dactylifera* L.)**].

Bol. Minist. Agric., Rio. de J. 1945 : 34 : 1-101.

This review includes references to the literature on the breeding, manifestation of xenia and metaxenia, and varieties of the date palm. Most of the references are to work done in the U.S.A.

1764. MORETTINI, A. 634.63:581.162.32(45)
L'incremento produttivo negli olivi "Moraiolo" e "Frantoio," con l'impiego di adatte varietà impollinatrici. (**Increased yield in the Moraiolo and Frantoio olives by the use of suitable pollinating varieties**).
Ital. Agric. 1941 : 78 : 631-39.

Comparisons of fruit set by open pollination with the amount set in inflorescences enclosed in bags confirmed that the variety Moraiolo was self-sterile. The varieties most suitable for pollinating it were Pendolino and Morchiaio, and by artificial pollination with these varieties sets greater than those from open pollination have been obtained. Thus after bagging the set was 0.07%, after open pollination 4.97%, and after pollination with Pendolino 5.14%.

The variety Frantoio is self-fertile, but here too artificial pollination with Morchiaio and Pendolino raised the set from 1.22% to 4.60% and 4.48% respectively. Other varieties tested exerted a much less favourable influence as pollinators.

1765. ALMEIDA, F. J. DE 634.63:581.47(46.9)
Formas leucocarpas de oliveira *Olea europaea* L. (**White fruited forms of olive, *O. europaea* L.**).
Bol. Soc. Broteriana 1945 : 19 : 617-34.

Subspontaneous olives bearing white fruits are reported from Beringel, Vale-de-Figueira and Vila-Velha-de-Ródão, and cultivated white fruited forms from Elvas, Lardosa, Alcobaça Mato-de-Miranda, S. Miguel-de-Acha, Vila-Nova-de-Ourém and Penalva-do-Castelo, all in Portugal. Descriptions of the shape of the fruit are given for the forms from Elvas, Beringel, Mato-de-Miranda and Vila-Velha-de-Ródão. It is reported that the seed from some of the white fruited types germinates well.

1766. ŠURAKOV, F. 634.7(47)
Berries on the Kola Peninsula.

Agricultural Chron., Moscow 1946 : No. 11 : 5-6. (Mimeographed).

The work of the Polar Experimental Station on the selection and culture of berry fruits is briefly described. During the last 20 years, over 500 varieties of strawberries, raspberries and red and black currants have been tested. The Grove, Louisa, Saxon and Yukunda strawberry varieties are being increased for general cultivation in the Kola Peninsula. The Turner, Mammoth, Marlborough, New Kuzmina and Spirin Seedling No. 4 varieties of raspberry are also being increased; another promising raspberry variety has been derived from a local wild raspberry known as Hibinka. In addition the Dutch red currant variety and the local wild red currant Varzuga, and the Marmit blackcurrant have been found to grow well in this region.

1767. PORPÁZY, A. 634.71:575.127.2(43.91)
Málna-szeder namesítési kísérletek. (**Crosses between raspberry and dewberry**).
Bull. Hung. Coll. Hort. 1944 : 10 : 143-45.

Crosses were made between the raspberry (*Rubus idaeus* L.) and dewberry (*R. caesius*). The author describes the F_1 as closely resembling the dewberry, which was used as the male parent. Even in the F_3 generation the hybrid was highly sterile. Crosses were then made between the hybrid and *R. loganobaccus* Bailey. The new hybrids were more winter hardy than *R. loganobaccus*. Both the colour and flavour of the fruit showed a wide range.

T. P. B

1768. 634.711:582
ROZANOVA, M. A. 634.711:576.312.35:582
(**Some species, sub-species, and varieties within the conspecies, *Rubus idaeus* L.**)

Botaničeskii Žurnal (J. Bot. U.R.S.S.) 1945 : 30 : No. 1 : 44-48.

The taxonomic sub-divisions suggested for the conspecies *R. idaeus* L. take into account not only morphological characters, but also geographical and ecological distinctions. *R. sachalinensis* is reported to have a chromosome number of $2n = 28$, whereas *R. vulgatus* and *R. strigosus* each have a chromosome number of $2n = 14$.

1769. THOMAS, H. E. and
GOLDSMITH, E. V.

634.75:575(79.4)

The Shasta, Sierra, Lassen, Tahoe, and Donner strawberries.

Bull. Calif. Agric. Exp. Sta. 1945 : No. 690 : Pp. 12.

The new Shasta, Sierra, Lassen, Tahoe and Donner strawberry varieties are described. Although their dessert quality may be inferior, these varieties have the advantage of a long fruiting period extending into the autumn, good marketing qualities, and, with the exception of Donner, resistance to virus yellows. In breeding the five varieties, selections involving *Fragaria chiloensis* were used as a source of resistance to yellows, while the Nich Ohmer variety was chiefly used to introduce the capacity to yield an autumn crop.

Shasta was produced from the cross California 67·5 (Nich Ohmer x U.S.D.A. 634) x California 177·21 [U.S.D.A. 543 x California 68·24 (U.S.D.A. 634 x New York 4636)], and is recommended for the central coastal region in California. It is fairly resistant to mildew and yellows; it is also somewhat resistant to *Verticillium* wilt. The bearing season usually begins in the last week of April; the quality is fair to medium.

The Sierra variety is particularly recommended for cultivation in the foothill districts of California. It has been bred from a cross between Nich Ohmer and Cal. 177·21 [U.S.D.A. 543 x Cal. 68·24 (U.S.D.A. 634 x N.Y. 4626)]. The variety is moderately resistant to yellows; it is late maturing and possesses good dessert quality.

Lassen originated from a cross between Cal. 21·9 [Blakemore x Cal. Z9 (Banner x Fendalcino)] and Nich Ohmer x Cal. 86·6 [U.S.D.A. 634 x Cal. Z11 (Banner x Fendalcino)]. It is adapted to the central coastal region; it appears to be highly resistant to yellows, moderately susceptible to mildew and very susceptible to *Verticillium* wilt. The variety usually gives three peaks of high production throughout the season; there is usually a late crop, maturing in October and November. The dessert quality is somewhat low.

Tahoe, a late maturing strawberry, has also given high yields in the coastal area, especially in the Salinas district. It has been derived from a cross between Cal. 144·21 (Narcissa x Nich Ohmer) and Cal. 143·32 [Narcissa x Cal. BH-14 (mixed crosses)]. The variety is fairly resistant to *Verticillium* and yellows, and comparatively resistant to red spider attack. The dessert quality is medium.

Donner is a selection of a cross between Cal. 145·52 [Cal. BH-14 (mixed crosses) x Red-heart] and Cal. 222 [Cal. 66·2 (U.S.D.A. 634 x Banner) x Cal. 7120 (Blakemore x Nich Ohmer)]. It is an early variety, which has also given good yields in the coastal area.

Donner is susceptible to yellows, *Verticillium* wilt and the cyclamen mite; it is however resistant to mildew. The dessert quality is good.

1770. WALDO, G. F.,
DARROW, G. M.,
JEFFERS, W. F.,
DEMREE, J. B. and
MEADER, E. M.

634.75-2.411.4-1.521.6:575(73)

Breeding strawberries for resistance to red-stele root disease.

Trans. Peninsula Hort. Soc. 1946 : 36 : No. 5 : 22-33.

A useful summary is given of strawberry breeding for resistance to red core (*Phytophthora Fragariae*) in the United States, including details of work carried out at Corvallis, Oregon, and Beltsville, Maryland. Aberdeen appears to be the most resistant variety and the chief source of resistance in breeding promising resistant selections. Selections of *Fragaria chiloensis* also possess some resistance. A successful method of testing a large number of seedlings in a relatively short time in the greenhouse in mid-winter is described.

1771. LATIMER, L. P.

634.75.00.14(74.2)

Performance of strawberry varieties in New Hampshire.

Bull. N.H. Agric. Exp. Sta. 1946 : No. 368 : Pp. 12.

The results of variety yield trials during the period 1935-42 are summarized. Howard 17, the chief commercial variety in New Hampshire, maintained its general superiority; only the Pathfinder variety compared favourably with Howard 17 as a possible choice for commercial cultivation.

1772. AMERINE, M. A. and WINKLER, A. J. 634.8(79.4)
Grape varieties for wine production.
 Circ. Calif. Agric. Exp. Sta. 1943 : No. 356 : Pp. 15.
 Varieties recommended for wine production in California are discussed.

1773. NIKOLAISHVILI, D. 634.8:575(47)
The Viticulture and Wine-making Research Institute (Georgian Academy of Sciences).
 Agricultural Chron. Moscow 1946 : No. 12 : 8-11. (Mimeographed).

The work of the Viticulture and Wine-making Research Institute of the Georgian Academy of Sciences in the Alazan Valley is described. The institute was founded in 1931. Approximately 900 varieties of grapes have been planted in the experimental vineyard. In addition, experimental plots have been established in several other places. Investigations have shown that certain grape varieties can grow and ripen at an altitude of 4,000 ft above sea level. Six new varieties of white and red grapes have been produced by hybridization. Local grapes with high quality, such as the Tkisvazi, Kisi and Chitistvala varieties, and an early ripening, small-fruited grape, with a sugar content reaching 24%, has also been discovered.

Various other investigations, such as disease and pest control, methods of cultivation, and the problems of wine manufacture, are also in progress.

1774. AMERINE, M. A. and WINKLER, A. J. 634.8:581.6(79.4)
Composition and quality of musts and wines of California grapes.
 Hilgardia 1944 : 15 : 493-673.

A report is given of extensive tests on the composition and quality of the musts and wines produced from a large number of grape varieties grown in various parts of California.

1775. DALMASSO, G. 634.835:575.1
 La genetica nella viticoltura moderna. (**Genetics in modern viticulture**).
 Genetica Agraria, Roma 1947 : 1 : 187-203.

A general outline is given of the practical results attained by the use of hybridization in the improvement of rootstocks, table and wine grapes in France, Italy and Germany. In Italy the most notable success has been achieved by Pirovano, working almost exclusively within the species *Vitis vinifera*, with or without the application of electromagnetic treatment to the pollen. Some of his dessert grape varieties are truly outstanding in quality, and attain a relatively high degree of resistance to cryptogamic diseases. Other successful Italian breeders of dessert grapes are mentioned too; the author has effected improvements in wine grapes by crossing some of the best wine varieties with others having perfect flowers, so producing high quality varieties with higher and more reliable yielding abilities. G. Ceccarelli has obtained an F₂ seedling from a cross of Negro Amaro x Couderc 9a which combines the resistance to phylloxera of the latter parent with the good flavour of the former, and is entirely free from foxiness.

In referring to the German vine breeding, the main feature emphasized is the enormous scale of the work, involving numbers of seedlings running into five figures or more, and the fact that in this way it has been possible to achieve almost complete resistance to phylloxera and other diseases in seedlings of *V. vinifera*, without recourse to American species. For instance, in 1936 some 20 million selfed seedlings were sown, and among them 7 were practically resistant to downy mildew.

Brief reference is made to vine breeding in Russia and other countries, and the final conclusion reached is that although modern genetical principles can undoubtedly contribute towards the improvement of breeding methods, the results obtained so far by the original methods are far from unsatisfactory and no radical change is recommended for the time being.

1776. DALMASSO, G. and
COSMO, I.

634.835:581.162.5

II. Contributo allo studio della biologia florale della vite. (**Second contribution towards the study of the floral biology of the vine**).
Annu. Staz. Sper. Vitic. Conegliano 1940-41 (1941) : 10 : 311-79.

Experiments were made in a number of successive years on the seed set obtained from the artificial pollination of a number of the main vine varieties in different combinations of pollen and seed parent. The results obtained at the Conegliano viticulture station, and even the type of flower, were not always the same as those reported elsewhere, and some of the differences are thought to be ascribable to physiological causes. Certain varieties, however, such as Rhenish Riesling and Furmint regularly proved difficult to pollinate with foreign pollen. No confirmation was obtained of the supposed effect of radiation of different wave lengths upon the success of pollination.

Many varieties known as having female flowers produced a certain amount of pollen, and when this was used to pollinate certain varieties with hermaphrodite flowers quite a number of seeds were set; the actual set varied according to the variety used. The flowers were bagged in the usual way and although the possibility of the entry of foreign pollen was not entirely excluded, it is improbable that this could have accounted for all the seeds set. The fertility of the pollen produced in the flowers of such varieties is much affected by environmental conditions. The occurrence of parthenocarpy and apogamy is also not excluded, and experiments to test this have given strong indications that both phenomena occur or can be induced. Experiments with typically seedless varieties such as Sultana and Sultanina have shown that their pollen is perfectly fertile and this seedlessness is due entirely to anomalies of the pistil.

In the second part of the paper, the full details of the experiments are presented. A list is given of the self-fertile varieties, distinguishing between those in which normal seed development occurred after selfing, and those that gave seedless fruits. Further lists enumerate the varieties found to be self-sterile and those not examined for fertility but found to have hermaphrodite flowers. All the self-fertile forms had perfect hermaphrodite flowers; just over 9% of the forms studied had flowers of the female type. Pollen germination tests were carried out with a number of varieties. The pollen of all the self-sterile varieties tested germinated; that of a number of self-sterile varieties failed to germinate in artificial media of various types. In difficult cases, a higher percentage germination was obtained in stigmatic fluid than in any of the artificial media. Varietal differences were noted in respect both of the percentage germination and the length of the pollen tube. Pollen from flowers of the female type failed to germinate even in stigmatic fluid, and when stained and examined under the microscope proved to be entirely without pores. The final conclusion reached is that varieties with female flowers should not be used in viticulture, even those varieties such as Bicane which produce exceptionally fine dessert grapes, or first class wine varieties such as Friulano Piccolit or Istriano Moscato Rosa. Fertile hybrids preserving most of the excellent qualities of the last named varieties have been obtained at the Conegliano station and further breeding work on these lines is in progress.

1777. PROSPERI, V.

634.835:581.165.711:575.127.2(45)

Nuovi vitigni portainnesti di produzione italiana. (**New vine root stocks produced in Italy**).
Ital. Agric. 1941 : 78 : 165-70.

The author started work on the production and selection of seedlings of American vines in 1905, since which time several thousand seedlings have been examined from the point of view of resistance to phylloxera, calcareous soil and drought, and for affinity with the main scion varieties. Descriptions are given of four of the best seedlings selected; two of them are hybrids of *V. riparia* x *V. rupestris* and the other two of *V. Berlandieri* x (*V. riparia* x *V. rupestris*).

1778. RODRIGUES, A.

634.835:581.45

O número e a disposição dos feixes foliares nas suas relações com a forma fôlha da videira. (**The number and disposition of the foliar bundles in their relations to the form of the leaf of the vine**).

Bol. Soc. Broteriana 1945 : 19 : 635-54.

Details are presented on the vascular morphology of the petioles of the varieties Riparia Grande Glabra, Rupestris du Lot and Riparia x Rupestris 3309.

1779. COSMO, I. 634.835:581.6(45)
 Varietà di uve da tavola da consigliare nelle Venezie. (**Dessert grape varieties recommended for the Venetian provinces**).
 Ital. Agric. 1941 : 78 : 589-601.

A thorough study has been made of 77 varieties of dessert grape grown in different representative areas of the Venetian provinces and tables are presented indicating their main characteristics, including time of ripening, fruit colour, flavour, and dessert quality. On the basis of these observations, a list is given of the varieties recommended for cultivation in the different maturity groups. Descriptions of the recommended varieties follow, with illustrations and indications of origin, breeder, synonyms, etc. There are four varieties in the first early class, two with white and two with red fruit; all have muscat flavour. In the early group there is however only one variety, S. Anna di Lipsia: there is clearly scope for breeding work to fill this gap. Each of the three remaining groups contains several recommended varieties.

1780. STOUT, A. B. 634.84:575(74.7)
The Interlaken Seedless grape.
 J. N.Y. Bot. Gdn 1947 : 48 : 92-94.

An account is given of the Interlaken Seedless grape (cf. Absts 874 and 876).

FORESTRY 634.9

1781. LYBYE, S. 634.97:575(48.9)
 Skovtraeforaedling. (**Forest tree breeding**).
 Hedeselsk. Tidsskr. Aarhus 1947 : 68 : 49-52.

In this simple account of methods of forest tree breeding in the arboretum at Hørsholm under Syrach Larsen's direction, stress is laid on the value and technique of artificial pollination in greenhouse or forest stands in combination with grafting and budding to hasten breeding operations.

Trees for which controlled pollination is particularly useful are the white birch (hvidbirk), *Betula verrucosa*, the French mountain pine and the Sitka spruce, each of which is liable under natural conditions in Denmark to be cross-pollinated by a related species, and is therefore rarely found genetically pure and true to type.

Artificial pollination can however also be used to produce interspecific hybrids as Syrach Larsen's work on canker resistant larches shows.

Polyploidy, as exemplified by Nilsson-Ehle's work on giant aspens, and its combination with grafting, budding, and the taking of cuttings must also play important roles in forest tree breeding.

1782. SYRACH LARSEN, C. 634.97:575(48.9)
Estimation of the genotype in forest trees.
 K. Vethøjsk. Aarsskr. 1947 : 87-128.

Experiments on the estimation of the genotype of forest trees by the study of clones of selected trees are described. The material investigated included grafted clones of beech, ash, *Betula pendula* Roth., *B. pubescens* Ehrh., *Larix decidua* Mill., *L. leptolepis* Murr., hybrids between these two *Larix* species, *Picea Abies* Link, and *Pseudotsuga taxifolia* Brit. The clones of each species have been planted out under the greatest possible uniformity of environmental conditions, in such a way that they can be compared row by row. Observations on tree growth and shape have been recorded.

The preliminary data obtained indicate that such experiments provide a means of determining valuable genotypes. The author suggests that collections or "tree shows" of desirable genotypes should be planted and studied, with the co-operation of arboreta, research stations and other institutes. In order to determine the breeding value of selected trees, experiments on artificial pollination are also recommended, in conjunction with the establishment of "seed plantations" of vegetatively propagated good genotypes, even before the breeding value of the genotypes has been assessed. As information on the breeding value of individual trees progresses, the less valuable material can be eliminated from the "seed plantation". Other lines of research suggested include tests of clones for cold resistance; observations on flushing and leaf fall; disease resistance; and the testing of

different genotypes under different environmental conditions. Future experiments will also include cuttings and buddings in addition to graftings, and the use of more uniform stocks.

1783.

634.97:575.42

634.97:575.2

- HOUTZAGERS, G.

634.97-1.321.5

Onze bosschen na vijf jaren oorlog. No. VIII. Groote beteekenis van het gebruik van beter plantmateriaal. (**Our woods after five years of war. No. VIII. Great importance of the use of better planting material**).

Tidschr. Ned. Heidemaatsch. 1947 : 58 : 107-10.

In view of the great damage that has been done to Dutch woodlands by the use of pine seed of undesirable origin, a control committee for guaranteeing pine seed [Commissie Waarborg Herkomst Grovedennenzaad] was established and joined by nearly all Dutch growers. Further measures are however needed to ensure that seed shall be collected, not only from Dutch trees, but also from tall, slender erect types with desirable branching habit, specially of the laterals. Such types, which are more likely to transmit their genotypic characters to their offspring, may be found even among the pines growing on heaths, though, however, cone collectors being paid by the kilo, often take seed instead from more easily accessible low growing trees of undesirable bushy habit.

The ash, which is tending to replace the elm in Holland owing to the prevalence of elm disease, is another species of tree showing great variation in habit, and care should be taken to take seed or scions from late shooting trees, which in contrast to the early ones should produce well formed trees, and more and better quality timber. Similar observations on the great value of selection of seed and cuttings apply to the false acacia, in particular, and to most Dutch forest trees.

The new experimental station for forest cultivation under the directorship of Dr H. Van Vloten at Wageningen is to devote special attention to the selection and breeding of forest trees. Owners and administrators of forest land can co-operate by choosing with great care the trees from which seed is collected and by informing the Nederlandsche Heidemaatschappij [Dutch Society for Healthland Cultivation] of any specially well-formed specimens in bearing; progeny could then be obtained from them and the experimental station for forestry cultivation could have scions taken from them. All the most important forest trees could in this way be entered in the variety lists. Work of this kind is already well advanced with the ash, durmast oak, false acacia and lime.

1784.

634.97:575.42(48.5)

634.97:575(48.5)

LINDQUIST, B.

Skoglig rasförädling—några arbetsuppgifter. (**Race improvement of forest trees—some tasks**).

Svensk Snickeritidskr. 1945 : No. 1 : Pp. 4.

Prolonged excessive exploitation of forest resources in Sweden has led to the disappearance of certain racial types and of many valuable genotypes and to a deterioration in the total gene complex for high quality timber, and efforts are now being made to save the best race types and check the degeneration of the available selection of high grade hard woods. Any remaining elite types are not to be felled, but are to be regularly inspected and possibly progeny tested and used as a source of grafting material. In the surveys of elite trees in progress high standards will be observed in regard to rapidity of growth, straightness of stem, good structure and quality of timber and fine branching habit.

An inventory of birch, which with its varied types of timber was regarded as particularly likely to yield a good supply of high class trees for future breeding and reproduction on a large scale, has unfortunately shown that the best types likely to transmit their good characters hereditarily are now extremely rare, and though some may possibly be regained by breeding, in general the choice of material will have to be made merely from any "acceptable" residue. Fortunately Sweden is among the countries with the best birch material for breeding purposes.

Elite types of the extremely valuable birches such as the curly birch [masurbjörk] and the icebirch [isbjörk] should not be multiplied upon a large scale for the market, in view of the decreased demand; and the best trees should be retained as living specimens.

The so-called "smooth birch" [slätbjörk] is of greater economic importance. It comprises different types with different uses, and breeding must proceed along several lines. The grey birch [gråbjörk], which belongs to the "smooth birch" class, needs to be improved in vigour of growth by breeding.

In discussing the defects of the Swedish oak the writer records the discovery of good types in certain districts and attributes the occurrence of superior élite trees in some regions to importations from Central Europe in the fourteenth and fifteenth centuries. Further importations from this source are recommended to obtain élite material adapted to conditions in Southern Sweden.

The production of seed in large quantities by the well-known method of grafting of small branches on stocks in pots and raising separate seed plantations of the various kinds of élite trees is a measure which should be pursued, in addition to surveys of the resources of Swedish forests in regard to different species of timber trees.

1785. SIBILIA, C. 634.972.8-2.421.9-1.521.6(45)
L'Ulmus pumila e la grafiosi. (U. pumila and the Dutch elm disease).

Bol. Staz. Pat. Veg. Roma 1940 : 20 : 147-49.

Although certain cases of attack by *Ceratostomella Ulmi* have been observed in *U. pumila* and a further case is here reported, the species is in the main found to be resistant, and by grafting the Buisman elm on to *U. pumila* rootstocks, a complete solution of the elm disease problem is thought to be provided.

1786. GOIDÀNICH, G. and AZZAROLI, F. 634.972.8-2.421.9-1.521.6(45).
 Relazione sulle esperienze di selezione di olmi resistenti alla grafiosi e di inoculazioni artificiali di "*Graphium ulmi*" eseguite nel 1939-1940.
(Report on experiments of selecting elms resistant to Dutch elm disease and of artificial inoculations of "*G. ulmi*" carried out in 1939-1940).

Bol. Staz. Pat. Veg. Roma 1941 : 21 : 287-306.

Further experiments to test the reaction of *Ulmus pumila* by inoculating with *Ceratostomella Ulmi* have proved the vast majority of trees to be resistant. Similar tests with *U. campestris* destroyed most of the plants, although four plants out of 160 tested remained free from infection. Grafts of *U. campestris* on *U. pumila* were less severely attacked and the four resistant plants when so grafted remained free after repeated inoculations. The form Villagrappa 3 was particularly outstanding in resistance. Resistant plants received from the Imperial Forestry Institute, Oxford, developed poorly but remained free from infection when inoculated.

Many of the natural hybrids of *U. pumila* tested proved to be as resistant as the *U. pumila* parent, though some susceptible hybrids were observed. The Buisman elm proved highly resistant in all tests.

1787. ATCHISON, E. 634.973:576.312.35
 634.42:576.312.35

ATCHISON, E.

Chromosome numbers in the Myrtaceae.

Amer. J. Bot. 1947 : 34 : 159-64.

The following fresh diploid chromosome counts have been made: *Psidium Cattleianum* and *Ps. variabile*, 88; *P. Guajava*, 22; *Eucalyptus citriodora*, *E. maculata*, *E. diversicolor*, *E. botryoides*, *E. resinifera*, *E. Kirtoniana*, *E. longifolia*, *E. Steedmanii*, *E. torquata*, *E. angulosa*, *E. camaldulensis*, *E. rudis*, *E. alba*, *E. Stuartiana*, *E. rubida*, *E. Gunnii*, *E. viminalis*, *E. calophylla*, *E. pulverulenta*, *E. triantha*, *E. obliqua*, *E. linearis*, *E. sideroxylon* and *E. Paulistana*, 22; and *E. redunca* and *E. corynocalyx*, 24.

The problem of the chromosomal invariance of the Leptospermoideae is discussed. It is suggested that the family originated in the western hemisphere, and spread over a wide area during the Cretaceous Period.

1788. LINDQUIST, B. 634.975:575.061.1(48.5)
 Studier över skogligt betydelsefulla svenska tallraser III. (**Studies on Swedish races of pine that are important for forestry III.**)
 Norrlands SkogsvFörb. Tidskr. 1938 : 4 : Pp. 29.

In this survey of variation in the crown type among Swedish pine populations, the mountain pine forests in the lappmarks of Torne and Lule and some districts in Finland, were chosen as the material for study.

The timber produced by broad and narrow crowned trees was also compared.

VEGETABLES 635

1789. MUNGER, H. M. 635.575.125(73)
The place for hybrid types of vegetables.

Trans. Peninsula Hort. Soc. 1946 : 36 : No. 5 : 49-57.

Recent work on F_1 hybrids of the following vegetables is discussed; onion, cabbage, summer and winter squash, water-melon, musk-melon, cucumber, tomato and egg plant.

1790. CARSON, C. M. 635.15(49.2)
 635.65(73)

CARSON, C. M.

Preview of '48 . . . All-Americas.

Sth. Seedsman 1947 : 10 : No. 3 : 14-15, 54.

The following new vegetable varieties are described: Puregold snapbean, and Freezonian and Victory Freezer peas, produced by Rogers Bros Seed Company; the Ranger and Cherokee snapbeans, produced by Associated Seed Growers; Cherry Belle radish, put on the market by A. R. Zwaan and Son, Voorburg, Holland; and Peerless bush Lima bean, developed by the United States Department of Agriculture.

The Cherry Belle radish is described as an exceptionally bright scarlet globular variety, with small slender tap-roots, short tops, and a marked absence of pithiness.

The Puregold bush snapbean is a selection of Rogers Sensation, showing uniformity in type and maturity. It has exhibited resistance to common bean mosaic. The Ranger snapbean is a high-yielding, white-seeded type with a semi-trailing habit. The Cherokee bush snapbean was developed from a single plant wax-podded selection of Asgrow Stringless Greenpod (Tendergreen). It is medium early and uniform in maturity, and the pods are held up off the ground.

The Peerless bush Lima bean was produced from a cross between Sieva and Fordhook. It is a high-yielding variety suitable for use as a fresh and processed bean; it has shown heat resistance.

The Victory Freezer pea is suitable for quick freezing, and it possesses promising resistance to cold and heat. The haulm is determinate, with the double pod bearing habit. The variety is medium early in maturity, uniform in season and wilt resistant. Freezonian was selected from a cross between Thomas Laxton and Roger's wilt resistant World's Record pea. It gives higher yields and is more resistant to wilt and cold than Thomas Laxton.

1791. JONES, H. A.,
 PERRY, B. A. and
 DAVIS, G. N. 635.25:575.42
The new Excel.

Sth. Seedsman 1947 : 10 : No. 3 : 13, 57, 60.

The production of an improved strain of the Yellow Bermuda onion is reported. The strain, which is known as Excel, formerly Yellow Bermuda 986, produces fewer bolters, off-coloured bulbs and other undesirable onions than the original variety. It is also reported that the new strain yields 35% more onions of high quality, and matures 10-14 days earlier.

1792. YARWOOD, C. E. 635.25-2.411.4-1.521.6
Onion downy mildew.

Hilgardia 1943 : 14 : 595-691.

The paper includes a summary of information on the occurrence of downy mildew (*Peronospora destructor*) on *Allium* spp., and a report is given of experiments carried out in California on the susceptibility to the disease of *A. Cepa* varieties.

1793. JONES, H. A.,
PORTER, D. R. and
LEACH, L. D. 635.25-2.411.4-1.521.6:575(79.4)
**Breeding for resistance to onion downy mildew caused by
Peronospora destructor.**
Hilgardia 1939 : 12 : 531-50.

The following three sources of resistance to *P. destructor* (Berk.) Casp. have been found as the result of tests in California: a male-sterile selection from Italian Red, designated strain 13-53; strain 13-20-3, also derived from Italian Red; and F₁ hybrid selections of crosses between Red 21 and two inbred strains of Stockton Yellow Flat. Strain 13-53 is considered to be the most promising source of resistance, since it possesses seed stalks immune to the disease and highly resistant foliage.

The results of experiments on the reaction of varieties and hybrids to the disease are summarized. Certain F₃ and back-cross progenies involving strain 13-53 as the resistant parent show promising resistance.

1794. NYBOM, N. 635.26:576.312.35
Accessory chromosomes in *Allium*.
Hereditas, Lund 1947 : 33 : 571-72. (Abst.)

Accessory chromosomes have been discovered in a sample of *A. Porrum*. These undergo normal disjunction at pollen mitosis.

1795. JANSEN, J. A. and
RIETSEMA, I. 635.36.00.14(49.2)
Spruitkoolvariëteiten op zandgrond. Verslag eener vergelijkende proef in
1938 in den proeftuin der R.K. Landen Tuinbouw School te Breda.
(Brussels sprout varieties on sandy soil. Report of a comparative
trial in 1938 in the experimental plots of the R.K. Agricultural and
Horticultural College at Breda).
Meded. Tuinbouw VoorlichtDienst, 's-Gravenhage 1939 : No. 12.
Pp. 28.

Forty varieties from France, England, Holland, Denmark and Germany were included in this trial, to compare their growth habit, quality of the sprouts (size, firmness, colour and flavour), time of production and susceptibility to diseases, and to record any aberrant and inferior plants, including bolters and plants with rotten stems. Winter hardiness could not be determined owing to the extreme severity of the winter.

Detailed results are given with photographs of the plants. The best variety was the new selection of Bredasche Beek, which gave a very good and early crop of good quality. Another Dutch selection, Nunhem's Spiraal, and the Danish variety Nykastrupgaard Toftö St. are also mentioned as very good, though not at their best under conditions of the trial.

1796. CHILDERS, N. F. and
ROBLES, P. S. 635.52:581.143.26(72.95)
Slobolt lettuce for the tropics.
Agric. Amer. 1947 : 7 : 93-95.

The new Slobolt variety of leaf lettuce has given a satisfactory performance in Puerto Rico (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1179). The variety was bred from a cross between the Grand Rapids lettuce and a small butterhead variety with an extremely low tendency to bolt introduced from France.

1797. EINSET, J. 635.52:581.162.5:576.356.4/5
**Aneuploidy in relation to partial sterility in autotetraploid
lettuce (*Lactuca sativa* L.).**
Amer. J. Bot. 1947 : 34 : 99-105.

Autotetraploid lettuce strains are comparatively sterile (0-50% fertility); aneuploids differing from the tetraploids by the loss or addition of one to three chromosomes are extremely sterile. The degree of sterility is not significantly reduced by cross-pollination. Sterility could not be explained as a simple consequence of chromosomal disturbances during meiosis.

1798. KNOTT, J. E. and
TAVERNETTI, A. A. 635.52-2.8-1.521.6(79.4)
Production of head lettuce in California.

Circ. Calif. Agric. Ext. Serv. 1944 : No. 128 : Pp. 51.

The lettuce varieties now grown in California are the New York and Imperial varieties and strains. Notes are given on these varieties, which are classified into those susceptible to brown blight and those resistant. The following varieties are described as resistant: Imperial 152, Imperial 615, Imperial D, Imperial 847, Imperial 44, Imperial 456, Great Lakes, Growers' E-4 and Growers' 253. The cause of the disease is unknown.

1799. GIMESI, N. 635.62:576.354.4(43.91)
A növénysejt osztódásának mechanikája. (**Mechanics of plant-cell division**).

Bull. Hung. Coll. Hort. 1942 : 8 : 142-55.

Investigations on the microsporogenesis of *Cucurbita Pepo* L. are reported.

The spindle and cell plate were found to be orientated double-refracting bodies. Explanations are put forward to explain the orientation and movement of the cytoplasm during carycocinesis. T. P. B.

1800. JENKINS, J. M. (JUN.) 635.63-2.411.4-1.521.6:575(73)
Mildew resistance needs maintenance!

Sth. Seedsman 1947 : 10 : No. 6 : 64-65.

Downy mildew resistant cucumber varieties produced from crosses of Puerto Rico No. 37 or Puerto Rico No. 40 with standard commercial varieties are shortly to be released. The importance of rogueing susceptible plants on the part of seed growers is emphasized.

1801. SOMOS, A. 635.64:575(43.91)
Adatok a "Turul" paradicsomfajta ismeretéhez. (**A new tomato variety "Turul"**).

Bull. Hung. Coll. Hort. 1943 : 9 : 87-94.

The new Turul tomato variety has been bred from the cross Danish Export x Pres. Garfiel, by J. Magyar. The new variety closely resembles Danish Export but is drought resistant. Data are included on chemical composition. T. P. B.

1802. YAMADA, T. 635.64:575(96.9)
A new tomato.

Hawaii Fm and Home 1944 : 7 : No. 4 : p. 7.

A new tomato variety has been selected from Pritchard, and named Hawaiian Paradise. The variety is distinguished by its very large flower clusters, which reach a length of two feet; the flowers are well spaced. Breeding work is being carried out to combine the favourable characteristics of the new variety and those of Bounty.

1803. BUZULIN, G. S. 635.64:575"793"(47)
(Production of early varieties of tomato).

Agrobiologija (Agrobiology) 1946 : No. 2 : 140-43.

The tomato Mičurinskii Želtyi [Mičurin's Yellow] is a standard form, 40-50 cm. in height, bearing its fruits close to the main stem, is disease resistant, and yields up to 2 kg. of fruit per plant; but it is mid-late in ripening time and has therefore been crossed with the early variety, Budenovka. The F₁ resembled the latter variety; 48 F₂ plants were grown, all from one F₁ plant, and from them an F₃ plant was produced. The yield of most of the F₃ plants exceeded that of the parents, and the three lines with the best combination of earliness and yield were selected; 1 had red fruits and 2 yellow. The best of the yellow varieties ripens at Mičurinsk on 1 August, 10 days before Budenovka and 15 days before Mičurin's Yellow. It has been named Novomonastyrskii.

The variety Stambovyj (Standard) was crossed with the currant tomato, *Lycopersicon pimpinellifolium*, and the F₁, consisting of 136 plants, all had the trailing habit of the latter parent; some of the plants ripened even earlier than the earlier species and these were selected for producing the F₂. One fruit of every F₁ plant was also sown for comparison. The different F₂ families differed in the character of their segregation, in some, for instance, no forms with standard growth habit appeared; the proportion of spreading to standard

types in the whole F_2 was 211:400, but the proportion in the different families varied from 3 : 1 to 17 : 1. The earliest segregates were obtained from the earliest maturing F_1 plants. One selection was made which began ripening in 1944 on 20 July, before any of the existing varieties. Its yield was good, the quality of the fruit was classed as high, though they were small and borne in clusters, and they are considered very useful for conserving.

1804. POLJANKOVA, T. 635.64:581.165.71:576.356
(Changes in the chromosome number and morphology in tomatoes under the influence of grafting).

Agrobiologija (Agrobiology) 1946 : No. 2 : 128-130.

Seeds of the second generation from grafts of the tomato Ponderosa on *Solanum Dulcamara* and of Sparks on Epicure potato were sown, and the seedlings subjected to cytological analysis. Those of the former combination, which showed the greater deviation from the type morphologically, proved normal in both root tips and pollen grains, having 24 somatic chromosomes. In the latter combination, however, the chromosomes of five plants examined were more elongated and varied in number from 48 to 51; abortive pollen grains were also observed with some frequency.

1805. LEE, F. A. and SAYRE, C. B. 635.64:581.192.02(74.7)
Factors affecting the acid and totals solids content of tomatoes.
 Tech. Bull. N.Y. St. Agric. Exp. Sta. 1946 : No. 278 : Pp. 28.

Experiments were carried out on the effect of variety, stage of the harvesting season, soil type, fertilizers, and minor elements upon the acid and total solids contents of the tomato.

1806. DESLANDES, J. A. 635.64-2-1.521.6(81)
Fatos sôbre doenças do tomateiro. (Data on the diseases of the tomato plant).

Bol. Minist. Agric., Rio de J. 1944 : 33 : No. 2 : 1-70.

This survey includes accounts of the resistance of tomato varieties grown in Brazil to the following diseases: *Stemphylium Solani*, spotted wilt, *Phytophthora infestans*, *Fusarium bulbigenum* var. *Lycopersici*, *Verticillium albo-atrum*, *Cladosporium fulvum*, *Ascochyta Lycopersici* and blossom-end rot.

1807. FOSTER, H. H. 635.64-2-1.521.6:575(73)
A report on certain tomato lines, selections and varieties under observation at the Mississippi Truck Crops Branch Station during 1945 and 1946.

Plant Dis. Reporter 1946 : 30 : 410-16.

Greenhouse and field tests of the resistance of tomato lines to *Fusarium* wilt and other diseases are reported. The material studied included lines from the U.S. Vegetable Breeding Laboratory, the United States Department of Agriculture, Beltsville, lines from Indiana, Ohio, Missouri, Nebraska and Mississippi and 14 named varieties. A list of lines showing promising disease resistance and commercial qualities is given.

It is reported that breeding is under way to obtain field resistance to both early and late blight; resistance to common mosaic and other diseases is also hoped for.

1808. EPPS, W. M. 635.64-2.411.4-1.521.6(75.7)
Tomato late blight in South Carolina.

Plant Dis. Reporter 1946 : Suppl. 165 : 310-12. (Mimeographed).

It is briefly reported that resistance to blight was noted in several varieties and breeding lines of tomatoes. The most resistant varieties were Golden State and selections from Targinnie Red. The majority of resistant breeding lines apparently inherited their resistance from either *Lycopersicon pimpinellifolium* or Targinnie Red. Several lines, however, resulting from crosses between susceptible parents only, showed some degree of resistance. The observed resistance appeared to be limited to foliage resistance, since the fruits of all lines, with the possible exception of some of Targinnie Red selections, exhibited equal susceptibility. It is possible that the apparent resistance of selections of this variety is due to their sparse foliage, lateness of maturity, or tough skin.

1809. BANGA, O. 635.64-2.484-1.521.6:575(49.2)
Een vergelijking van het voor meeldauw onvatbare tomatenras "Veto-
mold" met enkele nederlandse rassen van kastomaten. (**A com-
parison of the mildew immune tomato variety Vetomold with
some Dutch varieties of greenhouse tomatoes**).

Meded. Tuinbouw. VoorlichtDienst, 'S-Gravenhage 1941 : No. 24 : Pp. 40.

Vetomold was compared with 11 other varieties. Detailed records are given of the main features of Vetomold, including growth habit and leaf shape, length of stem, earliness, fruit yield, type of cluster, and resistance to *Cladosporium fulvum*. Its reaction to other diseases is also mentioned.

With a view to the use of Vetomold in breeding a new superior variety, the inheritance of (1) resistance to mildew and physiological races of *C. fulvum*; (2) fruit locule number; and (3) smooth and ribbed fruits is considered.

The results of the present trials are discussed from the standpoint of a possible breeding programme.

1810. LAMPRECHT, H. 635.65:581.466:575.061.1:631.557(48.5)
En-, två- och treblommighetens praktiska betydelse vid förädlingsarbete
med ärtor. (**The practical importance of one, two and three
flowered types for the breeding work with peas**).

Agri Hortique Genetica, Landskrona 1947 : 4 : 79-98.

The Swedish brown bean, Stella, is very early, shows somewhat limited vegetative development, and is a very reliable yielder under conditions in Scania. Crosses made to increase its yield showed that lines with a higher yield, up to 15%, showed more vigorous vegetative development and ripened later, but that the increased yield depended on favourable seasonal conditions. Earlier maturing lines selected from such a cross are inferior to Stella both in vegetative development and yield.

Among the morphological and physiological characters not limited in their effects on yield by the length of the growth period, the writer chose the structure of the inflorescence in peas for more detailed study. The results of other workers on the genetical basis of the structure of the inflorescence in various genera is referred to and the following nomenclature for *Pisum* was drawn up: (a) plants with a single-flowered inflorescence with a more or less marked spur; (b) plants with a two-flowered inflorescence, without a spur; (c) plants, two-flowered, with a marked spur; and (d) three-flowered plants. This scheme, with or without a spur, has been used to indicate broadly the general composition of the progeny from a cross of a genetically three-flowered line No. 375 of sugar peas with a genetically single-flowered line No. 465.

Preliminary investigations showed that genetically two-flowered lines, which are very early and show only slight growth, usually develop only one flower.

In general the single-flowered or mainly single-flowered plants gave the lowest yield on the basis of number of pods, or length of pods or weight of seeds.

As regards the two and three flowered plants, the types $b + a$ and b yielded fewer pods than the three-flowered types, while the best two-flowered types $b + c$, $c + b$, and c equalled the three-flowered types in pod production. The two-flowered types always surpassed the three-flowered types by about 10% in length of pod, and also yielded a greater weight of ripe seeds.

It would therefore appear that no increase in yield can be obtained by replacing two-flowered by triple-flowered types.

The latter condition is attributed to the presence of the genes *fn* and *fna*. Moreover, it seems that the capacity for productivity finds its optimum expression in the best two-flowered biotypes $b + c$, $c + b$, and c , a view supported by the fact that genetically three-flowered, though mainly phenotypically modified two-flowered types, give higher yields than pure three-flowered plants.

1811. LEBEDEFF, G. A. 635.652:581.142:575.11
Studies on the inheritance of hard seeds in beans.

J. Agric. Res. 1947 : 74 : 205-15.

Previous work of the author (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1946) has indicated that pure lines of *Phaseolus vulgaris* possess heritable differences in the amount of

hard seed developed under a given set of environmental conditions, and also in the rate of softening of the hard seed in germination tests. The present paper reports investigations on the inheritance of the rate of softening shown by the impermeable seeds. The material studied consisted of crosses involving five selections; all the selections produced a high percentage of hard seed under the particular experimental conditions, but differed markedly in the rate of seed softening.

In the F_1 of crosses involving four of the selections, the rate of seed softening was similar to that of the parent with the higher softening rate, or intermediate. In the F_2 , the rates of seed softening showed considerable variation between those of the two parents. The results of crosses involving the remaining selection (No. 1130) varied. The F_1 plants were intermediate between the two parents in their softening rate, similar to the rate of the parent with the slower value, or considerably slower than the more slowly softening parent. The F_2 of crosses involving this particular selection exceeded in both slowness and rapidity the parental rates of softening, though the majority of the F_2 plants gave intermediate values. In progenies involving lines other than No. 1130, the parental values were usually recovered, indicating that only a few genes appear to be concerned in the determination of the softening rate of hard seed, and thus the possibility of breeding to eliminate hard seed.

1812. SMITH, F. L. 635.652:581.48:575.11.061.6

A genetic analysis of red seed-coat color in *Phaseolus vulgaris*.

Hilgardia 1939 : 12 : 553-621.

The beans of Red Kidney and other red-beaned varieties of *Ph. vulgaris* show the disadvantageous character of losing their red colour during harvest or storage, turning a brownish red or brown. Hybrids between several red-beaned varieties have therefore been studied to obtain information on the genetics of red testa, with the hope of introducing the character of stable red colour into the Red Kidney variety by subsequent breeding.

The following genetical analysis is suggested. A factor *P* determines the production of any colour in the testa; beans carrying *P* but without any complementary genes for colour are white, while beans homozygous for the recessive *p* are white whatever genes for colour development they may possess. The gene *M* conditions mottling in a number of red-mottled varieties; beans homozygous for *m* are self-coloured. The gene *Rk* produces a buff coloration of the testa, the recessive gene *rk* is responsible for the testaceous colour typical of the Red Kidney variety. Plants with the genes *M Rk* yield beans which are mottled on a buff background, while plants with the genes *M rk* are distinguished by beans which are mottled on a testaceous background. A gene *R* produces a deep red coloration of the testa; a factor designated *Bl* is a modifier changing the deep red colour to purple. A recessive gene *e* conditions the eye pattern of the bean; its dominant allelomorph *E* produces self-coloration.

Some evidence of complete linkage between *M* and *R* was obtained. Linkage between *P* and *Rk*, *M*, *Bl*, *R* or *E* could not be analysed, since all *p* genotypes possess white beans. The hybrids involving the Mexican Red bean showed most promise as material for the attempt to improve the colour of the Red Kidney variety.

1813. BURKHOLDER, W. H. and

BULLARD, E. T.

635.652-2.3-1.521.6(74.7)

Varietal susceptibility of beans to *Xanthomonas phaseoli* var. *fuscans*.

Plant Dis. Reporter 1946 : 30 : 446-48.

The reaction of 40 bean varieties and strains to inoculations of fuscous blight [*X. phaseoli* var. *fuscans* (Burkh.). Starr et Burkholder] is given. Great Northern No. 1, which is resistant to halo blight (*Pseudomonas phaseolicola* Dowson) and two bean viruses causing mosaic disease, also proved resistant to fuscous blight; it is thought that this variety should be of value in breeding work.

1814. SNEEP, J.

635.652-2.482-1.521.6

De Ascochyta-vlekkenziekte van de boon (*Phaseolus*). (The *Ascochyta* spot diseases of *Phaseolus*).

Tijdschr. PlZiekt. 1945 : 51 : 1-16.

Petrak found that while runner beans and the Korbfüller-Wachs [Fill Basket Wax] variety

of pole bean were not at all or only slightly attacked by the *Ascochyta* spot disease, kidney beans, and the Blauschotige Butter [Blue-podded Butter] variety in particular, were more severely attacked. The author, however, holds that the pole beans escape infection by their habit, which ensures that leaves and pods dry rapidly after rain, so that any spores that may have lodged on them cannot develop, and the plants thus remain uninfected.

All bean varieties grown in Holland are more or less susceptible. Of the kidney beans grown as field crops, the white varieties, including Blanka, Walcheria, Witte Krombek and Witte Stamboon CB., are the most susceptible; the Aka, Beka and Ceka brown beans are somewhat less susceptible, and the Noordhollandsche brown bean and the Groningen Stroogeel [Groningen Straw-coloured] bean are much less so.

With regard to French beans, Hubbeling relates the amount of infection to the degree of earliness, the earlier varieties being less liable to attack. It is not known whether physiological races of *A. Phaseoleorum* and *A. Boltshauseri* exist.

1815. MACKIE, W. W.

635.653:576.16

Origin, dispersal, and variability of the lima bean, *Phaseolus lunatus*.

Hilgardia 1943 : 15 : 1-29.

Previous classifications of the Lima bean are surveyed, and the author shows that the inclusion of all forms of the bean under the single species *Phaseolus lunatus* L. is the only justifiable classification on taxonomic grounds. The complete fertility of hybrids made between the various types of Lima bean, the presence of the glucoside, linamarin, in all lima beans, the specificity of a number of disease and insect pests, and the unchanging nature of the inheritance of characters such as habit, seed colour and leaf shape, whatever parents are involved, also provide evidence in support of the inclusion of all Lima beans in a single species.

The centre of origin of the Lima bean is placed by the author in Guatemala. The following three lines of dispersal are defined, corresponding with the trade routes of the Indians in pre-Columbian times, and identified by the progressive improvement in the size, form and quality of the beans as the distance from Guatemala increases: (1) the Hopi or northern branch; (2) the Carib or West Indian branch, which includes a spur terminating in Socorro Island about 400 miles off the west coast of Mexico; and (3) the Inca or southern branch. The further distribution of the Lima bean in post-Columbian times and the climatic adaptations within the species are also discussed.

1816. WESTER, R. E. and

MAGRUDER, R.

635.653.00.14(73)

Yield results of Lima bean trials in 1945.

Canner 1946 : 103 : No. 9 : p. 44, 46.

A summary is given of the results of the co-operative yield tests carried out on Lima bean varieties during 1946 in the United States. The varieties included were two early, large-seeded varieties, Early Market and Burpee Improved Bush; three large and thick seeded varieties, Fordhook, Concentrated Fordhook and Fordhook 242; and three processing types, U.S. 243, U.S. 343 and Henderson. The article also provides information on the varieties and locations included in 1946 trials.

1817.

635.654:575.42(81)

O feijão guando. (The cowpea).

Bol. Minist. Agric., Rio de J. 1943 : 32 : No. 1 : 95-96.

Introduced varieties of the cowpea are being selected for growing under Brazilian conditions at the Instituto de Experimentação Agrícola of the Ministry of Agriculture.

1818. MACKIE, W. W.

635.654-2-1.521.6:575(79.4)

Blackeye beans in California.

Bull. Calif. Agric. Exp. Sta. 1946 : No. 696 : Pp. 56.

The bulletin includes an account of breeding hybrid varieties of the blackeye bean or cowpea (*Vigna sinensis*) resistant to cowpea wilt (*Fusarium oxysporum* f. *tracheiphilum*), root knot (*Heterodora marioni*) and charcoal rot [*Sclerotium bataticola* (*Macrophomina Phaseoli*)]. The Iron cowpea was found to be resistant to these diseases, and crosses were accordingly

made between this variety and Blackeye. Information is given on the inheritance of the size, colour and eye characters of the seed, the type of the seed coat, the shape and size of the haulm, the time of maturity and other characters. By back-crossing disease resistant selections to Blackeye 15, promising new hybrid varieties have been developed. These varieties, which have been distributed to farmers, possess good commercial qualities, superior yielding capacity and a high degree of disease resistance.

1819. EVANS, R. J., *et al.* 635.656:581.192
Some factors influencing the protein, cystine, and methionine content of dry peas.

Cereal Chem. 1947 : 24 : 150-56.

The influence of fertilizer treatment, climatic conditions, stage of maturity, and variety on the protein content of dry peas was investigated. In a study of the Alaska, First and Best and White Canada varieties, it was found that White Canada contained a higher percentage of total protein and total and organic sulphur than the other two varieties studied, but that the varietal factor did not appear to affect the cystine or methionine contents since these were similar in all three varieties.

1820. CALDWELL, J. S.,
 CULPEPPER, G. W.,
 EZELL, B. D.,
 WILCOX, M. S. and
 HUTCHINS, M. C. 635.656:581.6(73)
The dehydration of peas.
 Canner 1947 : 103 : No. 13 : p. 13-16, 32, 34; No. 14 : p. 30, 34, 36-38, 40;
 No. 15 : p. 20, 22-25.

Experiments were carried out on 25 varieties and strains of peas to determine their suitability for dehydration. The material of each variety was separated by sieving the samples into various canners' sieve sizes. The different lots were then separately blanched, dehydrated, and stored for six months in sealed containers at 32° F. They were then cooked, and graded for colour, flavour, texture and desirability as cooked products. The final score for each variety was based on the average of all the scores obtained for the different sieve samples. The following varieties were rated as the best: Green Admiral, Improved Stratagem, Telephone, Teton, Thomas Laxton, World Record and Canner King. The Alderman, Gradus, Laxton Progress, Little Marvel and Premium Gem varieties made up a second group ranking only very slightly below the first.

It was found that the ascorbic acid content was highest in the smallest and youngest peas of the fresh samples of a given variety, and decreased progressively with increase in size. The Alaska, Pedigree Extra Early, Telephone, Early Harvest and Green Admiral varieties were consistently somewhat higher in ascorbic acid content at all stages of development than the other varieties. Retention of ascorbic acid after blanching was highest in the largest sieve sizes and decreased with decrease in size; Laxton Progress, Canner King, Pride, Shasta and Teton retained more than 90% of the ascorbic acid content. Retention of ascorbic acid after drying was approximately 50% of the original content; in the final refreshing and cooking process, two-thirds to three-fourths of the ascorbic acid retained after drying and storage was finally lost.

Carotene content in the fresh material of all varieties was low; and losses due to blanching and drying were in all cases small.

In general it was found that dehydrated peas more nearly approach the character and quality of flavour of freshly cooked peas than do canned peas.

1821. POLLARD, L. H.,
 WILCOX, E. B. and
 PETERSON, H. B. 635.656:581.6(79.2)
Maturity studies with canning peas.
 Bull. Utah Agric. Exp. Sta. 1947 : No. 328 : Pp. 16.

A study was made of the influence of the stage of maturity upon the yield, tenderness, and the starch and ascorbic acid contents of canning peas, using the Perfection and Early Perfection

varieties. The results of the investigations have a bearing upon the problem of obtaining uniform comparisons in conducting varietal trials.

1822. CARLES, J. 635.658:581.6(44)
 La lentille du Puy et son cru. (**The Le Puy lentil and its authentic form**).

Bull. Soc. Bot. Fr. 1945 : 92 : 169-72.

The Le Puy lentil is characterized by its superior flavour and quick cooking, but these qualities are not manifested when the variety is grown outside Haute Loire, in such regions as Algeria. It is suggested, by way of explanation, that the superior qualities of the variety depend on its not reaching physiological maturity as happens in Algeria. Since, however, the Algerian and the Haute Loire samples are similar in appearance, the author concludes that a distinction should be drawn between anatomical and physiological maturity, both samples attaining the first, but only the Algerian material the second.

1823. ERWIN, A. T. 635.67:576.16(73)
Sweet corn not an important Indian food plant in the pre-Columbian period.

J. Amer. Soc. Agron. 1947 : 39 : 117-21.

Evidence is submitted in support of the view that sweet corn was not an important cultivated plant among the Indian tribes in the United States during the pre-Columbian period, in answer to criticism of this conclusion made by G. F. Carter in his book "Plant Geography and Culture History in the American Southwest" (cf. *Plant Breeding Abstracts*, Vol. XV, p. 375).

BOOK REVIEWS

06:633

Sveriges Lantbruksförbund. Årsbok 1945, 1946-47. (**Swedish Agricultural Union. Yearbook 1945, 1946-47**).

Lantbruksförbundets Tidskriftsaktiebolag Stockholm 1945 : 4.25 kronor : Pp. 256. 20 tables. illus.; 1946-47 : 4.25 kronor : Pp. 225. 22 tables. illus.

Two more volumes of this useful Swedish year-book, the first of which was reviewed in *Plant Breeding Abstracts*, Vol. XV, p. 28, have now appeared.

The 1945 volume contains, as well as a review of economic conditions in Sweden, also information on questions of Scandinavian co-operation in agriculture and on the future of Swedish agriculture.

A description is also given about the association movement and the development of its various branches. In addition to a handy reference book, the reader will also find information on agreements made with various co-operative movements and on livestock, timber, etc.

The 1946/47 volume is on similar lines with in addition much that is of interest on pre- and post-war international agricultural organization, Swedish dairying, live-stock, timber, building, educational methods, etc. Useful statistical matter has also been included.

ASHBY, E.
Scientist in Russia.

5(47)

Penguin Books, Harmondsworth, Middlesex and New York 1947: 1s. 0d.
Pp. 252. 4 figs.

The author of this vivid account of life—not as the title would suggest, only science—in the Soviet Union begins his story with a quotation from Dostoevsky and the whole book is imbued with an unusual insight into the psychological make-up of the Russian people, with their endless contradictions and inconsistencies, a knowledge of which is indispensable for a correct appraisal of the scientific situation. Professor Ashby has had unique opportunities of learning to know the Russian character and is at pains to point out the difference between the sincere friendliness towards foreigners shown by the people and the deliberate suspicion of the state and official bodies. He gives a succinct but comprehensive account of the organization of science in the U.S.S.R., which leaves the reader impressed by the scale on which science is provided for, the extent of the planning to which it is subjected and—the width of the gap between the plan and the achievement. Of a Soviet laboratory one reads with some relief that “there seems to be no scrupulous insistence on regular attendance; many of the senior workers have part-time jobs elsewhere; the women have to spend a long time every week in food queues; and the leaders of laboratories are rarely at work before eleven in the morning”.

The whole system of education of a Soviet citizen who is to become a scientist is described in the following chapters, with details of the curricula; again one is conscious of the greater degree of political control than we are familiar with in the countries with more liberal ideologies; and even in the research field the official philosophy of dialectical materialism is supposed to form the corner-stone of all investigation. How far this is actually the case is a matter of opinion. Professor Ashby states “The outstanding impression, however, on the foreigner who works among Soviet scientists, is that the bulk of Soviet science shows no sign of having been influenced by Marxian philosophy at all; it has clearly been carried out by western methods and it conforms to western canons of criticism”; and “The body of science is healthy in Russia, and even the ulcerous outbreak of Lysenko is slowly being purged from Russian biology.” Professor Ashby wrote this in July 1946. We can find no indication, however, in the official publications of the Soviet Union, either in the scientific or the popular and semi-popular press, of any diminution in the support given to the views of Lysenko and his school, or of the hostile attitude to its critics.

Not the least interesting parts of this book are those devoted to descriptions of events, such as the Jubilee Celebrations of the 220th Anniversary of the Academy of Sciences and a railway journey to Murmansk. In these the author adds a lively and delicate

literary style to his shrewd insight into the Russian character. They are described with a benign realism reminiscent of Chehov and show a true appreciation both of the many virtues and the many defects of the Russian people, so difficult to understand for western readers not familiar with the background and history of their civilization.

In summing up his opinions regarding Russian scientific achievements Professor Ashby concludes that "a great quantity of scientific work is done in the Soviet Union because a great number of workers has been mobilised to do it. The quality of scientific work, in the Soviet Union as elsewhere, is no better than the quality of the worker."

5 : 016

Supplement to the Catalogue of Lewis's Medical, Scientific and Technical Lending Library, Supplement 1944-1946.

H. K. Lewis and Co., Ltd., London 1947. Price: to subscribers 2s. 6d., to non-subscribers 5s. : Pp. iv + 176.

Since the revised edition of this catalogue, reviewed in *Plant Breeding Abstracts*, Vol. XV, p. 372, was published the scope of the Library has been extended to comprise works on higher mathematics. Other additions, some of which are related to subjects already included, have made the following additional headings necessary in the subject index: Aviation Medicine; Engineering Drawing; Engineering—Mechanical; Engines; Firearms; Industrial Research; Inventions and Patents; Mathematics; Psychology—Analysis; Servomechanisms; Workshop Practice; etc.

There are 526 subject headings and in addition a useful alphabetical list of the subject headings used.

Numerous cross references are provided in the Author and Title section of the index and biographies are now given under the name of the subject of the biography and the author of the book.

The subject index contains, in addition to initials and dates, also explanatory key words or abbreviations indicating the particular aspect of the subject dealt with in a particular book. Agriculture and related branches of science are represented by the following subject headings among others: Farming, Animal Nutrition, Livestock, Crops and Pastures, Chemistry, Horticulture and Bacteriology, Machinery, Fertilizers and Soils, Tropical Agriculture, Biochemistry, Biology, Botany (including Diseases and Pests), Fungi, Genetics and Heredity, Zoology and Microscopy.

The work will be of use to both research workers and ordinary readers.

VAN UVEN, M. J.

519.24 :631.421

Mathematical treatment of the results of agricultural and other experiments.

P. Noordhoff N.V., Groningen and Batavia 1946 : 2nd Ed. Pp. vi + 310.

The first edition of Dr Van Uven's *Mathematical Treatment of the Results of Agricultural and other Experiments* appeared in 1935 and was reviewed in *Plant Breeding Abstracts*, Vol. VI, p. 331. The second edition is a photographic reprint of the first, the War having made it impossible to bring out a new and revised text. The preface to the second edition draws attention to changes which the author would have liked to introduce, had a revised text been possible.

BOUNOURE, L.

57

**L'origine des cellules reproductrices et le problème de la lignée germinale.
(The origin of the reproductive cells and the problem of the germ line).**

Gauthier-Villars, Paris 1939 : 120 fr. Pp. xii + 271. 85 figs.

Weismann's theory of the germplasm affords one of the most striking examples of a zoologism, a theory elaborated on zoological evidence and proposed as a general biological theory, irrespective of the fact that it receives little support from studies with plants. Weismann's theory, as Professor Bounoure shows in the very interesting historical part of his book, was put forward in its essentials by several of his predecessors, and has even a remote affinity with the eighteenth century hypothesis of *emboîtement des germes*. It subsequently declined however and today is advocated by comparatively few. Professor Bounoure, however, is

convinced that Weismann's theory was correct in its main essentials, and he assembles all the available evidence to show that the reproductive cells constitute an uninterrupted lineage from which the somatic cells arise by what is called somatic-germinal segregation. The evidence is drawn in its entirety from animal embryology, where indeed Professor Bounoure is able to demonstrate many instances in which the reproductive tissues are distinguishable very early in the ontogenetic cycle from the somatic cells.

However, there are numerous cases in the animal kingdom where an early segregation into reproductive and somatic cells cannot be demonstrated, and in the plant kingdom extremely few cases where it can. To meet these cases, Professor Bounoure puts forward two suggestions, firstly, that somatic-germinal segregation is delayed in these forms, whose apparently somatic cells are therefore to be regarded as in reality germinal, and secondly, that present day technique is insufficiently advanced to detect the distinction between somatic and germinal cells, which, though similar to the eye, are yet physiologically distinct. These two explanations are unsatisfactory, and in fact are elastic hypotheses, extensible at will, and so constructed that they escape the possibility of experimental check. For, to any example put forward in which somato-germinal segregation cannot be detected, the author is able to reply, either that it has been delayed—although what the difference is between delayed somato-germinal segregation and ontogeny in which this assumption is discounted is difficult to conceive—or that somato-germinal segregation has occurred but cannot be detected. Somato-germinal segregation and the uninterrupted lineage of germinal cells are not observable, and cannot be inferred from the data; therefore they cannot be justified on inductive grounds.

Professor Bounoure, however, suggests that his theory receives support from its explaining three biological facts, viz. the totipotency of reproductive cells, the failure of the transmission of acquired characters, and the relative constancy of the ontogeny and morphology of each species. This claim can be criticized on two scores, first, that the hypothesis of an uninterrupted germinal lineage does not in strict logic lead to the three facts mentioned, and second, that alternative hypotheses are just as adequate or even more so. The author suggests that the positiveness of the theory proposed is itself a recommendation when viewed in the light of the negative attitude of its critics. This position is hard to defend. Induction from observed facts is the normal business of science. The introduction of hypotheses of their nature incapable of check is an exercise in imagination and its scientific value is extremely questionable. The author is, in addition, eager to point out the teleological nature of embryological development, on which topic he follows Beard and Conklin closely. Here again, it is difficult to rest satisfied. Ontogeny is acclaimed as a teleological process, mainly because it manifests the regular recurrence of an extremely intricate process. It is valid to infer from this that biological processes are characterized by regularity and complexity. Whether it is possible to go further and talk about underlying teleologies is very much open to doubt. Professor Bounoure has written a most stimulating book, with most of which the reviewer is in entire disagreement, believing, unlike the author, that no theory is better than a theory incapable of strict verification. *L'Origine des Cellules Reproductrices* is attractively written and especially valuable in its historical sections and in the way it assembles and deals with the opinions of other writers on these controversial subjects. It can be recommended to the attention of all students of the fundamentals of biological theory.

PIGMAN, W. W. and
WOLFROM, M. L. (Editors).

576.31:581.192

Advances in carbohydrate chemistry.

Academic Press Inc. N.Y. 1946 : Vol. 2 : 36s. 6d. Pp. xiv + 323. Tables.
(H. K. Lewis & Co., Ltd. London).

Volume I of this series was reviewed in *Plant Breeding Abstracts*, Vol. XVI, p. 368. The second volume of the series follows very similar lines, containing ten review articles by authorities in the particular fields of carbohydrate chemistry. The emphasis throughout is on the strictly chemical side, but the biological aspects are not ignored; in one article, "The interrelation of carbohydrate and fat metabolism" by H. J. Deuel and M. G. Morehouse, it is very much to the fore. There is little in the volume of direct interest to

geneticists, but M. Stacey's review of the chemistry of mucopolysaccharides and mucoproteins refers *inter alia* to *Pneumococcus polysaccharides* and to blood group specific substances and there is also an article on bacterial polysaccharides by T. H. Evans and H. Hibbert. From these articles one can gain some idea of how much progress the chemists have made in accounting for the specificity of such substances, a problem of great genetical interest.

J. L. F.

WYMAN, D.

58.006(71 + 73)

The arboretums and botanical gardens of North America.

Chronica Botanica Co., Waltham, Mass. 1947 : 10 : \$1.50. 395-498.

Plates 27-43.

This report on the arboretums and botanical gardens of the United States of America and Canada was prepared under the auspices of the American Association of Botanical Gardens and Arboretums. The information given in the main part of the directory on 90 such plant collections was compiled from answers to a general questionnaire circulated to the botanical gardens and arboretums in spring 1947, on their functions, specializations, number of species and varieties, ownership, libraries and herbaria, and other items. It is interesting to note that 25 of the 90 gardens and arboretums described are engaged in plant breeding among their diverse activities; much of this work is directly concerned with plants of economic value. The establishment of a botanical garden or arboretum presents a number of problems, and the author discusses these in an article "How to establish an arboretum or botanical garden". Proposed and discontinued gardens and arboretums, and small collections of particular kinds of plants are also listed. Prints and photographs of old and modern arboretums and botanical gardens in North America and other parts of the world, and maps of several gardens illustrate the directory. The arboretums and botanical gardens included cover a very wide range of climatic conditions; this is brought out in a map of North America giving temperature zones. A bibliography is appended, including only references to literature dealing with the general functions of botanical gardens and arboretums. The report presents a useful and stimulating survey.

KENT-JONES, D. W. and

AMOS, A. J.

581.6

Modern cereal chemistry.

Northern Publishing Co., Ltd. 1947 : 4th Ed. 50s. Pp. vii + 651. 78 figs.

195 tables.

The fourth edition of this well known textbook follows the same general plan as the third (1939) edition (cf. *Plant Breeding Abstracts*, Vol. X, p. 68). The general scope has been somewhat widened by expanding the treatment of cereals other than wheat, which remains the principal subject of the book; a new chapter on vitamin assay has been added. As far as was possible under wartime conditions the treatment has been brought up to date.

The authors have packed into the book a great amount of information of value, not only to the cereal chemist but incidentally to the wheat breeder also. The book is perhaps rather inadequately illustrated but there are a wealth of tables and a good bibliography and index.

J. L. F.

THOMMEN, E.

581.9(49.4)

Taschenatlas der Schweizer Flora. (Pocket atlas of the Swiss flora).

Verlag Birkhäuser, Basel 1945 : Fr. 12.50. Pp. xiv + 294. 3001 figs.

Completeness with convenient size for the pocket and the lowest cost were the aims of the author when writing this pocket atlas of the Swiss flora. These aims have all been achieved with remarkable success.

In 240 pages over 3000 species and subspecies of the vascular plants of Switzerland and bordering countries are depicted; the smaller plants are shown in their entirety and the larger in sections or with their most prominent organs. Only from the genus *Rubus* have the less important species been omitted.

The scientific nomenclature adheres to the international rules sanctioned by the botanical congresses. The common names of plants are also given in German and French. At the end there are notes, an appendix and an index very clearly set out in varied type.

The black and white drawings, which may be coloured by the user of the atlas, have an elegance and a curiously graceful liveliness which is very unusual. Looking at these drawings, the reader is no longer surprised by the quotation from Cronin's "The Keys of the Kingdom" and that from the philosopher Bersot.

Eduard Thommen has produced a little work of art on a scientific subject and it should be of use to both expert and layman. E. W.

63(44)

Annuaire National de l'Agriculture 1947. (National Year-book of Agriculture 1947).

Horizons de France, Paris 1947 : Pp. xvi + 711. tables.

In spite of the recent many and frequent changes affecting agricultural organization and administration in France, some of which are still in process of realization or revision, the editors of the 1947 edition of the Annuaire National have made every effort to keep the year-book up-to-date in regard to information on administration, organization, research and advisory and technical services.

Part I deals with central agricultural organizations: The Ministry of Agriculture, National Agricultural Organizations (including the Agricultural and Veterinary Academies and the National Agricultural Bank), technical organizations, commissions, federations and the national unions, and bodies concerned with agricultural and technical instruction (including schools of various types).

Part II is concerned with the Regional and Departmental Organizations (alphabetically arranged).

Part III deals with producers and suppliers classed by the type of goods concerned, e.g. manure, cereals, insecticides, etc.

Part IV purposes to contain a review of the main trends of enquiry in the agricultural technical press during the year 1946, and this is accompanied by a bibliography of agriculture 1945-46 and a list of journals of agricultural interest.

Part V deals with the French agricultural legislation of 1946.

Even the above analysis fails to convey the immense amount of detailed and classified information which the year-book contains. The editors have met the exceptionally difficult problem of indexing such an enormous and varied collection of information adequately by providing numerous tables of contents and analyses of the various sections of the book. All agricultural institutions, consulates, and commercial firms and libraries for whom agriculture in France is a subject of importance should acquire a copy of this up-to-date and highly useful reference book.

AINSWORTH, G. C. and

BISBY, G. R.

632.4:030.8

A dictionary of the fungi.

Imperial Mycological Institute, Kew, Surrey 1945 : 2nd Ed. 20s. Pp.

viii + 431. 139 figs.

The second edition of this Dictionary embodies all the useful points of the first (cf. *Plant Breeding Abstracts* Vol. XIV, No. 1, p. 84) listing, in addition, the new genera up to 1944. It also includes a new arrangement of the Phycomycetes and short notes on more than fifty important mycologists. Changes have also been made to the key for the identification of families.

J. G. H.

632.7-1.521.6:001.4

Common names of British insect and other pests. Part I.

Mendip Press, Ltd., Bath 1947 : 2s. Pp. 30.

In 1944, a subcommittee was set up under the auspices of the Conference of Advisory Entomologists and the Association of Applied Biologists to prepare a list of common names of British plant pests, and pests attacking domestic animals, stored products and timber. As a first result of the work of this subcommittee, a list has been brought out of pests belonging to the following groups: Mollusca, Nematoda, Coleoptera, Hymenoptera and

Diptera. The pests are arranged alphabetically under each group, firstly in alphabetical order of the Latin names of the pests, and secondly in alphabetical order of the proposed English names. Where English names for any of the pests have already been proposed in the list of *Common Names of Insects Approved by the American Association of Economic Entomologists*, these are included. Footnotes deal with any cases of homonymy that have arisen from cases of divergent nomenclature as regards common names in England and America.

The need for standardizing the English names of pests is so great that any scheme likely to assist towards this end is very welcome. The list under review should be studied by all plant breeders interested in the development of varieties resistant to insect pests. It is to be hoped however that the existence of a generally accepted list of English names will not prejudice the habit of including also the Latin name of any pest mentioned in a scientific paper. Till now, constant confusion has resulted from the employment of English names of insect pests without any Latin equivalents.

633.2

**Advances in grassland husbandry and fodder production.
Second Symposium.**

Imperial Bureau of Pastures and Field Crops, Aberystwyth 1947 : Bull. 38 : 6s. 0d. Pp. 83. 6 figs. tables. maps.

This second symposium continues the practice adopted in the first of the series (cf. *Plant Breeding Abstracts*, Vol. XV, p. 90) in bringing together a miscellaneous collection of articles, quotations and reviews concerned with the problems of grassland husbandry and fodder production. A joint article by O. West and J. M. Rattray giving an account of the research programme on veld and pasture management in Rhodesia, and a communication by A. Kauter dealing with the effect of the war and its aftermath on forage production in Switzerland, are published for the first time. A reprint of an article by A. W. Ashby on the economics of ley farming which first appeared in *Farming*, Vol. I, No. 2, May-June, 1946, and a translation of a paper by I. S. Travin entitled "The present centres of intensive formation of plant species", are also included.

The section of reviews and quotations cover the following wide range of subjects: investigations on the improvement of upland grazings in Scotland; agricultural seed production as a new industry in Welsh farming; grassland research and advisory work in Sweden; birds-foot trefoil as a forage legume; hay dehydration in the south-western United States; investigations conducted by the United States Regional Pasture Research Laboratory; studies on the productivity of grass species in the tropical coastal belt of northern Queensland; weeds in Fiji; pasture and fodder plants in Sierra Leone; and the land resources of Tripolitania.

ALBERTS, H. W.

633.2(85)

The forage resources of Latin America. Peru.

Imperial Bureau of Pastures and Forage Crops, Aberystwyth 1947 : Bull. 37 : 2s. 6d. Pp. 24.

For the purpose of studying the forage resources of Peru, the country may be divided into three geographical regions, viz., the coastal region, the Sierra, and the Oriente or La Montaña. In the coastal region where forage is mainly produced as feed for dairy cattle, most of the forage lands are irrigated; the chief kinds of forage grown in this region are lucerne and para grass (*Panicum purpurascens*), supplemented by maize, which is cut and fed in the green state. In the Sierra, the range lands in the treeless mountainous areas are non-irrigated, and native grasses provide feed for sheep, llamas, alpacas, and some beef and dairy cattle. In the Oriente region tropical rain forest species of grasses form the chief source of forage. This bulletin presents a concise account of the grazing lands of these three different geographical regions in Peru, referring to the various forage species, supplementary pasture feeds, pasture and range management, the relative palatability of the various types of herbage, and other topics. The author concludes with a section on possible methods of improving the pastures and ranges of Peru.

	633.2-1.531.12(48.9)
ANDERSEN, J. C. and	633.31-1.531.12(48.9)
POULSEN, A.	633.32-1.531.12(48.9)
Avl af Markfrø. (Raising seed of field crops).	
kgl. Danske Landhusholdningsselskab, København 1946 : Pp. 226 :	
73 figs. 9 tables.	

The compilation of the first edition of this book (1943) was undertaken at the suggestion of the Royal Danish Agricultural Society to meet the need for an authoritative survey of seed production in Denmark. After the death of A. Poulsen, J. C. Andersen undertook the production of the second edition in which only minor emendations and additions were made, apart from the task of bringing the manual up to date.

The last review on the subject had been published about 20 years ago. In the interval seed breeding and raising in Denmark had gradually developed and much information had accumulated which should be of great assistance in the solution of urgent problems of the present day and also of value to the practical seed grower.

The new edition should therefore be welcome not only in Denmark and Scandinavia and Finland but also in other countries where standards of agriculture and seed production have reached a sufficiently high level to permit of the application of the systematic methods recommended for the production of high-grade seed.

The description of the historical background of the industry, starting from the 19th century, is a remarkable tribute to the enterprise and industry of outstanding men among Danish farmers, clergy, and teachers, engaged in agriculture and interested in its improvement and in promoting sound methods of grassland cultivation and the production of pedigree seed. In this task the foundation of the Dansk Frøkontrol by E. Møller-Holst, in 1871 and of the Markfrøkontoret (with which the names of C. P. Jacobsen and J. L. Jensen are connected) and of the Foreningen for indenlandsk Frøavl a few years later were important milestones. The work under review deals in detail with the proper methods of obtaining seed of high quality from the various herbage grasses and legumes, and mangels, beets, swedes, and turnips. The general plan, modified to suit each particular crop, may be exemplified by the following treatment of the clovers:—

An introductory historical note is followed by statistics on demand and production, and information on requirements regarding climate, soil rotation, method of sowing, manuring, care of the crop, ripening, harvesting, threshing, post-harvest ripening, hulling machines, prices and production costs, pedigree seed plots, pests, diseases, and the role of honey bees in the clover field.

Only the most important diseases and pests and their control are treated in greater detail. For further information interested readers are referred to Stabel and Bovien's book on that aspect.

Statistical tables are appended dealing with the financial aspects of the production, sale and exports and imports of seed in Denmark.

The clarity and simplicity of style and arrangement, so characteristic of the Danish works of this nature, and some photographs of crops and agricultural machines in action, further enhance the value of the work which should prove most valuable as a text book for educational purposes and as a manual for beginners as well as advanced students of the subject.

KRIMBAS, B. D.	634.835:582(49.5)
(Ampelography of Greece).	
Ministère de l'Agriculture, Athènes 1943 : Vol. 1 : Pp. 266. 150 pls;	
1944 : Vol. 2 : Pp. 189. 135 pls.	

About 600 B.C. the art of viticulture was brought by Greek colonists to Massalia (now Marseilles) whence it spread throughout Gaul and to certain districts of Western Germany. Greece remains, in spite of the devastation which she has suffered, a country specially favoured by her climate and other natural conditions for vine-growing and no study of her natural wealth can omit a survey of her vines and vineyards.

In 1930 a collection of Greek vines, established by the author on three hectares of land at the Ancienne École Supérieure Agronomique d'Athènes, made it possible for him to perfect

and amplify his study, begun in 1910, containing a provisional classification of the vines, and already awarded recognition by the Académie d'Athènes in 1928. Two other collections of vines were formed in Greece, one still in existence in the Royal desmène at Attica, and another at Patras: but no descriptions of them are extant.

Classical writings and the botanical literature of the 18th and 19th centuries show how numerous the vines of the country are; and the introduction to the monograph under review gives some interesting historical particulars of previous classifications of Greek vines and defines the system upon which the present work is based.

One of the main difficulties of classification is the fact that the "varieties" accepted in ordinary usage are not botanical varieties, clearly defined and easily distinguished. Moreover, bud mutations are frequent and the offspring may therefore differ from their parents; and environment too may affect the characteristics and qualities of interest to the grower, as distinct from the botanist.

The author has adopted the following basis for his classification: the shape of the berry (length/breadth), with a special category for seedless types; the colour of the berry; the ratio, length of berry/length of seed; the ratio, total length of seed/length of the main body of the seed, by which it will be possible to differentiate vines not otherwise readily distinguishable; and finally, the four main characteristics of the leaves represented by two fractions: (1) the shape of the leaf in relation to the number of lobes; and (2) the characteristics of the upper surface of the leaf in relation to the presence or absence and density or arrangement of the hairs on its under surface.

The system is simple and permits not only the grouping of related vines, but also the identification and removal in some instances of related vines to other groups. Moreover, the use of concrete measurements of the different organs provides for accuracy of description. The dates of budding, opening of the flowers, ripening and maturity are derived from observations taken in 1937 from the vine collection in Athens, created in 1930. A study of photoperiodicity will therefore also be possible. The resistance of Greek varieties of *Vitis vinifera* to drought is shown by a graded system of marks ranging from 4, very resistant, to 1, very susceptible.

The second volume contains the descriptions in alphabetical order of stocks from regions of Greece free from phylloxera and cultivated in the vine collection of the École de Hautes Études Agronomiques in Athens. Some of these vine-stocks, though of remarkable quality and undoubtedly of economic value, e.g. Monemvassie (Malvoisie), Dermatas, etc., are not widely found in Greek vineyards.

In addition to the vines described in these two volumes, there are others, less common, the study of which will be completed later. The foreign stocks introduced about 1920 into Macedonia and Thrace by the Greek refugees returning from Asia Minor, etc., will not be included in the study.

A point of interest to growers is that the vines have all been studied in a uniform environment and their economic features can therefore be compared and combinations of different types, suitable from the standpoint of time of ripening, introduced into the vineyards. Apart from its scientific value the monograph will aid the restoration of the Greek vine industry and the attainment by Greece of her former outstanding position as a wine-producing country.

The descriptions are given in Greek and in French and are accompanied by plates illustrating leaves and bunches of grapes of different varieties of vines.

The necessary indexes and a bibliography complete the work.

634.97

The use and misuse of shrubs and trees as fodder.

Imperial Agricultural Bureaux 1947: Joint Publication No. 10: 9s.

Pp. xxxiv + 231. 70 figs. 28 tables.

This publication reviews the experience and information at present available on the various problems of the utilization of trees and shrubs as sources of fodder. The importance of this type of vegetation in animal nutrition is often under-estimated; as the foreword of the bulletin points out, it is a humbling fact for grass pasture experts to realize that probably

more animals feed on trees and shrubs, or on plant associations in which trees and shrubs play an important part, than on true grass or grass-legume pastures, grass ranges and steppes.

The information has been arranged according to the different countries, each of which has its own particular problems of grazing and land utilization. Some sections have been contributed by specialists on the subject in the countries concerned, while others have been written in the collaborating Bureaux. One section gives in tabular form the chemical composition of fodder trees and shrubs, with bibliographical references. Indices of authors and investigators, plant orders, genera and species, common plant names and their botanical equivalents, geographical regions, and the addresses of the contributors are appended. The bulletin is illustrated by 70 photographs.

NEW JOURNALS

Advances in Genetics

Advances in Genetics is a new publication containing critical reviews of important genetical problems of both theoretical and practical bearing. It aims at covering the ever-widening field of genetical investigations; and it is hoped to publish not only reviews dealing with plant and animal breeding and human heredity, but surveys of research work in biochemical, physiological and other related fields.

The first volume contains the following papers of particular interest to plant breeders: "Cytogenetics and breeding of forage crops", by S. S. Atwood; "The origin and evolution of maize", by P. C. Mangelsdorf; "Types of polyploids: their classification and significance", by G. L. Stebbins; and "Cytogenetics of *Gossypium* and the problem of the origin of the New World cottons", by S. G. Stephens.

Advances in Genetics is edited by M. Demerec and is published by the Academic Press Inc., 125 East 23rd St, New York 10, N.Y.

Heredity

Heredity is a new journal edited by Prof. R. A. Fisher and Dr C. D. Darlington, publishing articles on breeding, cytology, statistical and biochemical genetics, and evolutionary theory of both plants and animals. Part I of the first volume contains the following articles of particular interest to plant geneticists and breeders: "Competition and dominance of incompatibility alleles in diploid pollen", by D. Lewis; "The theory of plant breeding for yield", by O. H. Frankel; and "An alteration in the gene frequency in *Ricinus communis* L. due to climatic conditions", by S. C. Harland. The first issue also contains a survey of genetic research in Britain during the period 1939-45, in the form of summaries prepared by various workers for the Genetical Society Conference held in London, autumn 1945, and a comprehensive bibliography of genetic research published in Italy and Germany from 1939 to 1945.

The journal is to be published three times a year. Annual subscription, 40s. or \$8.50 net; single copy, 14s. or \$3 net. Publishers: Oliver and Boyd, Ltd., 98 Great Russell Street, London, W.C.

Indian Cotton Growing Review

The *Indian Cotton Growing Review*, of which the first number has been received, is a new quarterly periodical issued by the Indian Central Cotton Committee, with the purpose of publishing articles on various aspects of cotton production, primarily in India, of interest to the general public, cotton growers and the trade; the first issue contains several articles dealing with cotton improvement in different parts of India. It is hoped in later issues to include notes on current literature. Communications concerning the journal should be addressed to the Secretary, Indian Central Cotton Committee, Nicol Road, Ballard Estate, Bombay.

Journal of the Institute of Corn and Agricultural Merchants Limited

The purpose of this journal of the recently formed Institute of Corn and Agricultural Merchants Limited is to publish articles by experts on scientific and technical developments affecting the corn trade in Great Britain, to report the activities of the Institute and to provide a medium for the exchange of information among members. The first number contains articles on the relationship between the National Institute of Agricultural Botany and the seed merchant, by S. F. Armstrong; virus diseases of potatoes and their importance to the commercial grower, by K. M. Smith; grassland and the work of the Stratford on Avon Grassland Improvement Station, by W. Davies; and other subjects. Extracts of literature, book reviews and the reports and proceedings of the Institute are also included. The journal is obtainable from the Secretary, The Institute of Corn and Agriculture Merchants Limited, 5, Copthall Chambers, London, E.C.2; price per copy 5s.

Pacific Science

Pacific Science is a new quarterly publication of the University of Hawaii, publishing papers on biological and physical subjects related to the Pacific regions. The first issue contains a paper on the history and present distribution of sandalwood on the Oahu Island, by H. St John, and papers on zoological, geological and geophysical topics.

It also includes the Recommendations of the Pacific Science Conference of the United States National Research Council.

The subscription price is \$3 per annum; single copy \$1. Subscriptions should be sent to "Pacific Science", Office of Publications, University of Hawaii, Honolulu 10, Hawaii.

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